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THE TRANSIM V MANUAL. VOLUME II. TRANSIM V USER'S MANUAL.(U)
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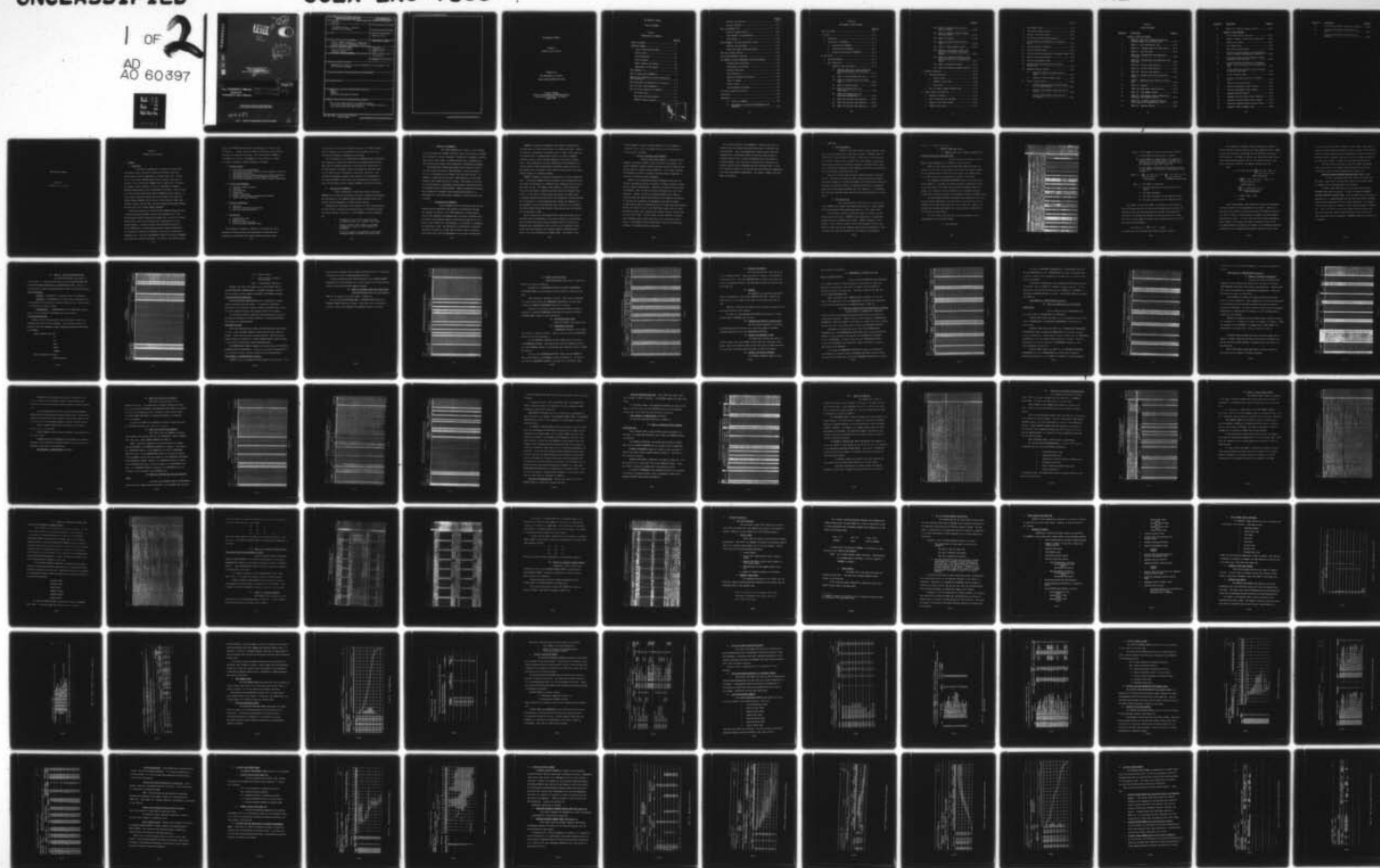
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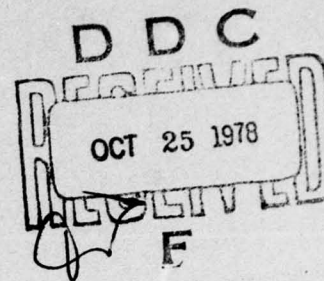


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The TRANSIM V Manual.
Volume II.
TRANSIM V User's Manual.

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UCLA-ENG-7855
September 1978

12 96p.

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1. REPORT NUMBER ENG-7855	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) The TRANSIM V Manual. Volume II: TRANSIM V User's Manual.		5. TYPE OF REPORT & PERIOD COVERED
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Project TRANSIM, Department of Engineering Systems, School of Engineering & Applied Science, University of California, Los Angeles		8. CONTRACT OR GRANT NUMBER(s) N00014-C-76-0112
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research 1030 Green Street Pasadena, California 90010		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE September 1978
		13. NUMBER OF PAGES 96
		15. SECURITY CLASS. (of this report) unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
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18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) PROMAP TRANSIM V simulation modeling/risk analysis		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This is the second volume of the TRANSIM V Manual. It discusses the format and procedures of the TRANSIM V input and lists and discusses the output reports.		

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THE TRANSIM V MANUAL

Volume II

TRANSIM V User's Manual

Prepared for

The Department of the Navy

Under Contract N00014-76-C-0112

Project TRANSIM

School of Engineering and Applied Sciences

University of California, Los Angeles

August 1978

TABLE OF CONTENTS

INTRODUCTION TO TRANSIM V

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	<u>Page No.</u>
Activity "Criticality"	I-12
Resource Analysis	I-13
What Can TRANSIM V Do?	I-15
Improved Planning Action	I-16
Establishment of Responsibility	I-16
Risk Analysis	I-18
Where TRANSIM V Has Been and Should Be Used	I-18
Research and Development	I-18
System and Combat System Acquisition	I-19
What Are the Data Sources?	I-20
How to Make TRANSIM V Effective	I-20
How TRANSIM V Assists Management in Decision-Making	I-22
Planning Under Uncertainty	I-22
Technological Uncertainty	I-22
Schedule Uncertainty	I-22
Cost Uncertainty	I-23
Resource Requirement Uncertainty	I-23
"What If" Gaming	I-23
Project Control	I-24
Risk Management Philosophy	I-24
How About Computer Facilities?	I-25
References	I-26
Appendices	I-27
A. History of TRANSIM	I-28
B. Key Elements of Project Risk Management with TRANSIM V	I-29

Volume II

THE TRANSIM V USER'S MANUAL

	<u>Page No.</u>
TABLE OF FIGURES	vi
A. General	II- 1
1. Background	II- 1
2. Description of TRANSIM V	II- 3
a. Planning with TRANSIM V	II- 4
b. Scheduling with TRANSIM V	II- 4
c. Resource Allocation with TRANSIM V	II- 6
B. Input Data	II- 8
1. Data Requirements	II- 8
2. Data Preparation	II- 8
a. TRANSIM V Input Data Sheets	II- 9
(1) FORM C-0 (Run Title, Storage Allocation and Workday/Calendar Date Conversion Data)	II- 9
(2) FORM C-1 (Activity/Milestone List)	II-14
(3) FORM C-1A (Schedule Start and Finish Dates)	II-17
(4) FORM C-2 (Activity Data)	II-19
(5) FORM C-2A (Probabilistic and Conditional)	II-22
(6) FORM C-2B (Probabilistic and Conditional Predecessors)	II-24
(7) FORM C-3A (Activity Time Exhibits)	II-26
(8) FORM C-3B (Activity Time Exhibits)	II-29
(9) FORM C-3C (Activity Time Exhibits)	II-29

(10)	FORM C-4A (Resource Pool Data and Rate/Cost Table)	II-29
(11)	FORM C-9 (Completed and/or Underway Activities Only)	II-34
(12)	FORM C-10 (General)	II-36
(13)	FORM C-10A (Risk Report Specifications)	II-38
(14)	FORM C-11 (Time Summary Graphs)	II-40
(15)	FORM C-12 (Criticality, Delay, Probability of Occurrence and Schedule Report).....	II-42
(16)	FORM C-13A (Schedule Tabulation Graph and Status Reports for Responsibility Graph)	II-44
(17)	FORM C-14 (Resource Reports)	II-44
(18)	FORM C-15A (Resource Summary Reports)..	II-47
C. Computer Operations		II-49
1.	Data Deck Structure	II-49
a.	Control Cards	II-49
b.	TRANSIM V Input Forms	II-49
c.	Final Cards	II-50
2.	How to Estimate Computer Running Time	II-51
D. Output Reports and Their Use		II-52
1.	Sequence of Reports	II-52
2.	List of Names Used in the Model	II-54
3.	Summary of Used Data Storage	II-54
4.	Schedule Risk Report	II-54

5.	Time Summary Graph	II-58
6.	Criticality Analysis Report	II-58
7.	Activity Criticality Report	II-61
8.	Activities Delayed Awaiting Resources	II-63
9.	Activity/Milestone Probability of Occurrence Report	II-63
10.	Activity/Milestone Schedule	II-63
11.	Activity Schedule Graph	II-67
12.	Activity Code and Description for Schedule Graph.	II-67
13.	Resource Utilization History	II-67
14.	Resource Requirements Graph	II-72
15.	Activity Code and Description for Resource Requirements	II-72
16.	Aggregate Resource Reports	II-75
a.	Cumulative Aggregate Resource History Graph	II-75
b.	Aggregate Resource Summary Graph	II-75
17.	Activity Status Reports	II-81
a.	Activity Status Report (Activities Under- way for Responsibility)	II-81
b.	Activity Status Report (Activities Due to Start)	II-81
c.	Activity Status Report (Activities Due to Complete)	II-81

Volume II

TABLE OF FIGURES

<u>Figure No.</u>	<u>Description</u>	<u>Page No.</u>
<u>TRANSIM V INPUT DATA SHEETS.</u>		
1	FORM C-0. (Run Title, Storage Allocation and Workday/Calendar Date Conversion Data)	II-10
2	FORM C-1. (Activity/Milestone List)	II-15
3	FORM C-1A. (Schedule Start and Finish Dates) ...	II-18
4	FORM C-2. (Activity Data)	II-20
5	FORM C-2A. (Probabilistic and Conditional Successors)	II-23
6	FORM C-2B. (Probabilistic and Conditional Predecessors)	II-25
7	FORM C-3A (Activity Time Exhibits)	II-27
8	FORM C-3B (Activity Time Exhibits)	II-30
9	FORM C-3C (Activity Time Exhibits)	II-31
10	FORM C-4A (Resource Pool Data and Rate/Cost Table)	II-32
11	FORM C-9 (Completed and/or Underway Activities Only)	II-35
12	FORM C-10 (General)	II-37
13	FORM C-10A (Risk Report Specifications)	II-39
14	FORM C-11 (Time Summary Graphs)	II-41
15	FORM C-12 (Criticality, Delay, Probability of Occurrence, and Schedule Reports)	II-43
16	FORM C-13A (Schedule Tabulation Graph and Status Reports for Responsibility Codes)	II-45
17	FORM C-14 (Resource Reports)	II-46

<u>Figure No.</u>	<u>Description</u>	<u>Page No.</u>
18	FORM C-15A (Resource Summary Reports)	II-48
<u>TRANSIM V OUTPUT REPORTS</u>		
19	List of Names Used in This Model	II-55
20	Summary of Number of Words Data Storage Used	II-56
21	Schedule Risk Report	II-57
22	Time Summary Graph	II-59
23	Criticality Analysis Report	II-60
24	Activity Criticality Report (with Predecessors Listed According to Decreasing Criticality).....	II-62
25	Activities Delayed Awaiting Resources (Listed According to Activity Code)	II-64
26	Activity/Milestone Probability of Occurrence Report (Listed According to Activity/Milestone Code)	II-65
27	Activity/Milestone Schedule (Listed According to Earliest Start Times)	II-66
28	Activity Schedule Graph	II-68
29	Activity Code and Description for Schedule Graph	II-69
30	Resource Utilization History	II-70
31	Resource Requirements Graph (Schedule)	II-73
32	Resource Requirements Graph (Summary)	II-74
33	Aggregate Resource History	II-76
35	Aggregate Resource History Graph (Schedule)	II-77
36	Aggregate Resource History Graph (Summary)	II-78
37	Cumulative Aggregate Resource History Graph	II-79
38	Aggregate Resource Summary Graph	II-80

<u>Figure No.</u>	<u>Description</u>	<u>Page No.</u>
39	Activity Status Report (Activities Underway).....	II-82
40	Activity Status Report (Activities Due to Start)	II-83
41	Activity Status Report (Activities Due to Complete)	II-84

THE TRANSIM V MANUAL

Volume II

TRANSIM V User's Manual.

Volume II

TRANSIM V User's Manual.

A. GENERAL.

1. Background.

UCLA Project TRANSIM and its predecessor research and development project activities at UCLA have received contractual funding support from the Department of the Navy since 1951. Development of the original TRANSIM general-purpose computer simulator was completed by the UCLA Project TRANSIM staff in 1966 after a three-year development program sponsored by the U.S. Department of Commerce, Maritime Administration, and the Department of the Navy. Prior to 1963, the Office of Naval Research was Project TRANSIM's primary sponsor. In recent years, major Navy support has been furnished by the Naval Sea Systems Command (NAVSEA) and the Office of Naval Research (ONR), with secondary support from the Naval Facilities Engineering Command (NAVFAC) and Naval Electronic Systems Command (NAVELEX).

The general objective of the UCLA Project TRANSIM Program has been to provide ongoing development research and implementation of the UCLA-developed computer simulation techniques and to provide a training program which would assure successful Navy implementation of this program package. A specific research and development objective of Project TRANSIM was to develop general-purpose computer simulation to its ultimate as a versatile, economical, easy-to-use, and effective management tool. The basic developmental "vehicle" has been the TRANSIM general-purpose simulation technique. By virtue of its general-purpose

design, the TRANSIM approach offers the advantage of a single, versatile modeling technique capable of replacing individual special-purpose techniques now employed by the Navy. The latest version, TRANSIM V, is designed to be used as a management tool by the Navy in a number of different management problem situations, including:

A. Systems Analysis

1. Early analysis of requirements.
2. Evaluating alternative concepts, system equipment, facilities and operating policies.
3. Determining efficient manning levels and resource allocation.
4. Calculating reliability vs. maintainability tradeoffs.
5. Determining integrated logistics support resource requirements.

B. Project Risk Management

1. Technical tradeoff analysis.
2. Planning.
3. Cost estimating.
4. Scheduling.
5. Resource allocation.
6. Project control (resource management and budget).
7. Change order impact analysis.

C. Production Scheduling

1. Shipyards.
2. Other Navy industrial installations.
3. Navy ship system contractors.

D. Risk Analysis

1. Technological risks.
2. Schedule risks.
3. Make-or-buy decision risks.
4. Cost and capital investment risks.

The technique is designed to exploit to the fullest the user's knowledge of problem situation and environment peculiarities while minimizing his involvement with tedious computer-oriented chores

by adhering to the principle of user-orientation, the TRANSIM computer-based techniques can be successfully used by personnel who are not familiar with computer programming and technology.

The "end products" of the UCLA Project TRANSIM Research and Development Program are currently in effective use on numerous Navy projects. Based upon the feedback experiences from such actual applications, it has been possible to improve, update, and expand the analytical power of the technique while increasing its analytical efficiency. This continuing development capability has resulted in the development of the current TRANSIM V version which has considerably more analytical power and efficiency than the original TRANSIM I and interim versions.

2. Description of TRANSIM V.

Unlike conventional critical-path network techniques, TRANSIM V can account for uncertainty in project planning and performance. The availability of the TRANSIM technique makes feasible project risk analysis and risk management of highly complex projects.

Management has long known of the existence of risk on many projects, but has not had a convenient and rigorous means of determining how much risk exists and how to control it. With TRANSIM V, project management can:

- o Determine the level of risk associated with its adopted project plan, schedule, and budget.
- o Develop a project plan, schedule, and budget conforming to a level of risk acceptable to management.
- o Control the project from beginning to end within acceptable limits of schedule and budget risks.

a. Planning with TRANSIM V.

The network planning of a project is the arranging of the precedence and sequence of project tasks as appropriate to provide the "road map" for project execution. Probabilistic planning of projects which can be either event- or activity-oriented (or a combination of both) differs only slightly from conventional, deterministic planning.

The probabilistic planner may include in his listing of project activities those not having a 100% likelihood of being performed at all; or, if performed, may not always follow the same sequence. For example, a design task may not have a 100% probability of realizing approval; some changes may have to be made. The planner can account for such uncertainty by providing a probabilistic network branch with an estimated chance of being realized. Similar probabilistic branches may be required to represent other planning uncertainties (i.e., the failure of a test would require diagnosis, corrective action, and a retest).

b. Scheduling with TRANSIM V.

Project managers are not universally aware that the expected project completion time produced by deterministic methods has, perhaps, as much as a 45 to 50% probability of being exceeded. This can have important consequences when the project completion date is keyed to such important events as starting the operation of a production line, moving into a new building, or a new bank, or completing the building of a ship. By definition, the deterministic "expected" completion time does not account for the actual range of completion times which result from the aggregation of all project uncertainties.

TRANSIM V utilizes the estimator's full range of experiences for its input data as a more accurate basis for schedule decisions. Whereas conventional, deterministic techniques utilize a single value which may be optimistically or pessimistically biased, the input to TRANSIM V involves a range of values from the smallest to the largest probable value. This bracketing of activity durations and the probabilities of various activity times falling within the bracket usually cancels out any personal bias on the part of the estimator and provides a far better indepth estimate for schedule purposes.

TRANSIM V produces as output the distribution of project completion times. The project manager then has available a data presentation which will allow his selection of a completion date compatible with an acceptable level of risk. For example, there might be a 10-20% likelihood that the actual project completion date may exceed the "expected"-date by 30%. In the case of a ship construction project, he might accept a scheduled completion date which has a 75% probability of being attained. For the delivery of a newly developed sonar system, the importance of the equipment to ship construction may cause selection of a procurement lead time schedule which will provide a 98% assurance that the equipment will be delivered in time.

Because capacity for risk-taking differs among individuals and for different project circumstances, each project manager on each different type of project has his own unique acceptable level of risk which is dependent upon considerations such as cost, size of investment, interaction with other projects, lost revenue, weather (completing before winter, etc.), and availability of budget funds. The ability of the

project manager to select a project schedule to fit the degree of acceptable risk is one of the unique features of the probabilistic network analysis technique.

c. Resource Allocation with TRANSIM V.

Projects always make demands on resources such as manpower, materials, machines, tools, facilities, and capital. All project schedules typically suffer from some scarcity of resources and the net effect is always to delay completion. As a result, analysis to determine how level of available resources affects scheduling is critical to effective project management.

Several of the conventional network techniques can account for resource requirements and the net effects on schedule caused by limitations in resource availability. Typically, the planner first develops the schedule. Next, he sums up the net requirements for each of the resources. Usually, the level of required resources will show intolerable peaks and valleys when viewed over the length of the project. If resources were unlimited, the management task would be simple: To merely assure that the resources were at the right place when required. However, due either to cost or to insufficient supply (such as highly specialized skills), most resources are severely limited, and the planner will "level" them. In other words, he will establish a resource level compatible with project objectives, cost, and resource availability. Establishing resource requirements using this deterministic technique is straightforward but inaccurate.

On real-life projects, the assignment of resources must also be dependent upon the variable start and finish dates of individual project activities. Thus, the probabilistic network planner deals with "probabilities" of different levels of resources being required on different project dates as will be experienced once the project is actually underway. As in the case of probabilistic scheduling, the resource decision will be dependent upon the acceptable level of risk. For a critical activity or for projects with firm completion commitments, a low risk level might be appropriate. For others, a higher risk level might be tolerated.

B. INPUT DATA.

1. Data Requirements

TRANSIM V, like other general purpose modeling techniques, can accept input data at any level of detail. Depending upon the availability of and the need for detail, a model may be very detailed in one area and relatively gross in other areas. For example, a ship acquisition project model will initially concentrate on design details; later on, as the project progresses, detail emphasis will shift to construction, then to outfitting, sea trials, and so on.

Data may be derived from the most reliable and readily available sources. Experience has shown that with proper interviewing techniques, subjective estimates of activity performance time obtained from experienced personnel are generally superior to experience data based on inadequate sample sizes (See Engineering Report No. 7111, Bongers, L. S. "Obtaining Task Time Data from Human Store and Factors Affecting Retrieval," December 1971.)

2. Data Preparation

For systems analysis applications only, please refer to the TRANSIM User's Manual (UCLA Engineering Report No. 7168, December 1971) and Supplement (UCLA Engineering Report No. 7443, August 1974).

The following sections of this manual apply to project risk management applications only. TRANSIM V data preparation is accomplished through the aid of preprinted data sheets. FORMS C-0 through C-15A, as described below, serve to collect all the data necessary to set up and execute a model, and include complete output report specifications. When completed, the forms are processed for the computer as described in

Section C., "Computer Operations."

a. TRANSIM V Input Data Sheets.

(1) FORM C-0 (RUN TITLE, STORAGE ALLOCATION AND
WORKDAY/CALENDAR DATE CONVERSION DATA).

The data described on FORM C-0 should appear at the beginning of the TRANSIM V input data deck.

FORM C-0 input begins with the RUN TITLE CARD which gives, in Columns 1-72, the title to be printed at the top of each page of output. It is recommended that the date of the run and/or a run number always be included in the title in addition to the name of the project.

The INTERNAL DATA STORAGE REQUIREMENTS CARD is the second input item on FORM C-0. The number of required internal storage words should be the only entry on the second input card and can appear anywhere in Columns 1-72. However, as seen in FORM C-0, for consistency purposes Columns 54-59 have been allocated for appropriate storage requirement entry.

The relationship between the internal data storage and the actual machine storage requirements to be specified in the job control deck is dependent on the installation where the job is being run. However, the internal data storage requirements for a given network is approximately the same for any installation.

For any network, the total data storage requirements can be approximated by the following formula:

$$T = 70A + RD(10+P)$$

ND WORKDAY/CALENDAR DATE CONVERSION DATA)

DATE _____

CARD SEQUENCE
OR IDENTIFICATION

74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

ENTER PRO

TIME INTERNAL DATA STORAGE ALLOCATED FOR THIS RUN IS: WORDS
WORKDAY/CALENDAR DATE CONVERSION (ENTER "YES" OR "NO" IN BOX)
BEGINNING DATE: DAY MONTH YEAR
USE TWO DIGITS FOR YEAR AND THE FOLLOWING ABBREVIATIONS FOR MONTH:
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC)
WORKDAYS (GROSS OUT THOSE NOT APPLICABLE): MON TUE WED THU FRI SAT SUN
HOLIDAYS (DAY MONTH, AND YEAR. FOR EXAMPLE: 4 JUL 73)
DY MON YR DY MON YR DY MON YR DY MON YR

FIGURE 1.

where T = Total number of words of storage space required;

A = Total number of activities in a network;

RD = Total number of resource pools to be reported on multiplied by the average number of workdays (or time periods, if time periods are used) over which the resource/cost pools are in use; and

P = Total number of words used for percentile resource or cost reports. (If there are no percentiles, P will be zero.)

$$\text{where } P = \underbrace{\left(\frac{I}{100} (n + 100 - u) + 4 \right)}_{\text{(percentiles)}} + \underbrace{\left(\frac{I}{100} (N + 100 - U) + 4 \right)}_{\text{(cumulative percentiles)}}$$

with I = The number of iterations

n = The lower percentile for the resource or cost report

u = The upper percentile

N = The lower percentile for the cumulative value

U = The upper percentile for the cumulative value

For example, if the total number of activities in the network is 662, and resource pool AA is in use on the average from time period 100 through 174; pool BB from time period 110 through 127 and again from time period 133 through 150; and pool CC from time period 212 through 406; then the total number of words of data storage required for the network would be approximately:

$$(70 \times 662) + \left(3 \times \frac{306}{3} \times 10 \right) = 49,400$$

or 46,340 words for activities and 3,060 for resource reports.

As an example of percentile storage requirement, consider a network with 600 activities and two cost codes, BCOST and TCOST. BCOST is used from time period 100 through 149 and TCOST from time period 100 through 199. For BCOST, we ask for cost report percentiles 10 and 90 and cumulative percentiles 5 and 95. For TCOST, we ask for cost report percentiles 2 and 98. One hundred iterations are run.

Then:

$$\begin{aligned}
 T = & 70 \times 60 + 50 \left(10 + \underbrace{\left(\frac{100}{100} (10 + 100 - 90) + 4 \right)}_{\text{BCOST percentiles}} \right) \\
 & + \underbrace{\left(\frac{100}{100} (5 + 100 - 95) + 4 \right)}_{\text{BCOST cumulative}} + 100 \left(10 + \right. \\
 & \left. \underbrace{\left(\frac{100}{100} (2 + 100 - 98) + 4 \right)}_{\text{TCOST percentiles}} \right) \\
 T = & 42,000 + 2,400 + 1,800 \\
 = & 46,200
 \end{aligned}$$

In the above example, the resource/cost reporting requirements are small relative to the requirements for activities. However, in many cases, the opposite is true either because the number of resource/cost pools is large, or because their use extends over many workdays/time periods, or both. In such a case, the data storage requirements may be reduced, if necessary, by either increasing the size of the time period (which is by default one workday, if not otherwise specified on Form C-10), or by suppressing printing of reports for some of the

resource/cost pools (by means of Forms C-14 and C-15A). More than one computer run may be made if necessary in order to obtain all the reports needed for analysis without loss of correlation of results, because the simulation will be identical from run to run if no changes are made in the input data (except, of course, for the report specifications).

The report given at the end of each run, giving the maximum data storage used, is an accurate accounting and can be used with confidence to predict future requirements for similar runs.

WORKDAY/CALENDAR CONVERSION SPECIFICATIONS--"YES" or "NO".

If "NO", then simply enter "NO" and go to the next form. The output reports will be specified in terms of the relative number of workdays from the beginning day of the network.

If "YES", enter "YES" and go on to the next line where the BEGINNING DATE should be entered. If "YES" is entered in WORKDAY/CALENDAR CONVERSION SPECIFICATIONS, cross out those days of the week not applicable (i.e., nonworking days) and list below this where indicated, those holidays taken which fall on a normal working day. For example, July the Fourth falls on a Tuesday in 1978, which is normally a working day. List 4 July 1978 in one of the columns as specified below (Keywords for months are listed on the sheet and are to be used in all cases where date entry is necessary). HOLIDAYS listed do not have to be in sequence.

(2) FORM C-1 (ACTIVITY/MILESTONE LIST).

The ACTIVITY/MILESTONE LIST (FORM C-1) follows FORM C-0. Entered on this form is the ACTIVITY/MILESTONE CODE, ACTIVITY/MILESTONE DESCRIPTION, and RESPONSIBILITY CODE. There are as many lines as there are Responsibilities coded for any given activity.

BASIC DEFINITIONS.

ACTIVITY. An ACTIVITY is a specific task to be performed.

MILESTONE. A MILESTONE is an activity whose performance time is essentially zero and does not take any resources; e.g., final delivery or acceptance of a group of tools.

RESPONSIBILITY. A RESPONSIBILITY is the individual, department, or code in charge of performing the listed activity.

ACTIVITY/MILESTONE CODE.

Coding of the activity entered on this form should be done in as simplified and clear a form as possible. The code must consist of a minimum of two and a maximum of eight contiguous characters--NOT LISTED AS A KEYWORD.

Some acceptable codes are:

01

A1

NAM3

56678

JOB00101

Some unacceptable codes are:

MONTH (keyword)

1.01 (decimal number)

A (only one digit; minimum of
two necessary)

AB 12 (noncontiguous characters)

Remember that these rules apply to all codes whether they be
ACTIVITY/MILESTONE, RESPONSIBILITY, or EXHIBIT references, and that
they are unique to their elements throughout the TRANSIM V package.

ACTIVITY/MILESTONE DESCRIPTION.

ACTIVITY/MILESTONE DESCRIPTIONS can be a combination of alpha-
numeric characters and blank spaces. It provides a "shorthand"
description of the activity, unless a complete description can be given
in the 40 columns allotted on the computer card for this purpose.

The Description appears, along with the Activity Code, on all out-
put reports pertaining to Activity Schedules. A missing description
will result in a warning message.

RESPONSIBILITY CODE.

Like the Activity/Milestone Codes, the Responsibility Codes consist
of two to eight contiguous characters which have not been listed as a
keyword. These codes are used to produce separate, selected Activity
Schedule Reports in addition to a master Schedule Report, which includes
all activities irrespective of their Responsibilities.

The RESPONSIBILITY CODE is entered on the same line as the ACTIVITY/
MILESTONE CODE and DESCRIPTION. If there is more than one Responsibility
for a specific activity, they are listed on the following line(s).

CARD SEQUENCE or IDENTIFICATION (optional).

TRANSIM V does not interpret any data punched in this section. This

section is most commonly used to provide identification and/or sequencing information as an aid in handling large data decks.

Certain installations have facilities which enter SEQUENCE NUMBERS automatically in these columns (i.e., this is done by the on-line editing features of many time-sharing computer systems).

(3) FORM C-1A (SCHEDULE START AND FINISH DATES).

ACTIVITY/MILESTONE CODE taken from TRANSIM V
FORM C-1 is entered in the first column of FORM C-1A.

For each ACTIVITY/MILESTONE CODE, a "SCHEDULE START" DATE and a "SCHEDULE FINISH" DATE may be listed. These dates are for referential use only. They do not influence the simulation results in any way.

PROJECT _____

TRANSIM V INPUT DATA SHEET FORM C-1A (SCHEDULE START AND FINISH DATES)
 Keypuncher: Punch data in shaded columns only when followed by year supplied data in the next (unshaded) field to the right

PAGE _____ OF _____

DATE _____

ACTIVITY/MILESTONE CODE (Maximum four characters)	SCHEDULE START DATE			SCHEDULE FINISH DATE			CARD SEQUENCE OR IDENTIFICATION (Optional)
	Day	Month	Year	Day	Month	Year	
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20
21	21	21	21	21	21	21	21
22	22	22	22	22	22	22	22
23	23	23	23	23	23	23	23
24	24	24	24	24	24	24	24
25	25	25	25	25	25	25	25
26	26	26	26	26	26	26	26
27	27	27	27	27	27	27	27
28	28	28	28	28	28	28	28
29	29	29	29	29	29	29	29
30	30	30	30	30	30	30	30
31	31	31	31	31	31	31	31
32	32	32	32	32	32	32	32
33	33	33	33	33	33	33	33

FIGURE 3.

(4) FORM C-2 (ACTIVITY DATA)

ACTIVITY/MILESTONE CODES should be taken from FORM C-1 and listed on FORM C-2.

Information on PREDECESSOR ACTIVITIES, RESOURCE REQUIREMENTS, and WORKING TIMES for each specified activity should be entered on this form.

There should be a minimum of one line. There can be a maximum of as many lines as there are PREDECESSOR ACTIVITIES or as many lines as there are RESOURCE REQUIREMENTS--whichever is greater.

Reference of the project network drawing and FORM C-1 would be necessary to determine PREDECESSOR ACTIVITIES and respective ACTIVITY/MILESTONE CODES assigned to these activities.

(a) ACTIVITY/MILESTONE CODES

Taken from FORM C-1 and entered here.

(b) PREDECESSOR ACTIVITIES

A PREDECESSOR ACTIVITY is an activity that precedes a specific activity. There can be more than one PREDECESSOR ACTIVITY for any given activity.

For the BEGINNING ACTIVITY, the word "NONE" would be entered as its PREDECESSOR ACTIVITY. There may be more than one beginning activity in a given NETWORK; however, all activities must eventually lead to a single end activity.

List the first PREDECESSOR ACTIVITY (taken from the NETWORK by CODE (either marked on the NETWORK or taken from FORM C-1). If there is more than one PREDECESSOR ACTIVITY, list them all on successive lines.

TRANSIM V INPUT DATA SHEET FORM C-2 (ACTIVITY DATA)

PROJECT _____

DATE _____

Key: punch data in shaded columns only when followed by user supplied data in the next (unshaded) field to the right

ACTIVITY CODE (From Form C-1)	PREDECESSOR ACTIVITIES (Use code from Form C-1) (Enter "NONE" for beginning activity)	RESOURCE REQUIREMENTS (Enter resource type and quantity per line)		SCHEDULED START DATE (Month, day, if "none")	WORKING TIME EXPENDED TO DATE (Number of hours, if "none")	WORKING TIME EXHIBIT REFERENCE (Enter number of hours corresponding to Form C-2A or Form C-3B)	ACTIVITY PERFORMANCE TO CONTINUE UNTIL START OF ANOTHER ACTIVITY (Use code from Form C-1) (Leave blank if not applicable)	CARD SEQUENCE OR IDENTIFICATION (Optional)
		Resource Type Name (From Form C-1)	Quantity Required					
01	A	01	01	01	01	01	01	01
02	A	02	02	02	02	02	02	02
03	A	03	03	03	03	03	03	03
04	A	04	04	04	04	04	04	04
05	A	05	05	05	05	05	05	05
06	A	06	06	06	06	06	06	06
07	A	07	07	07	07	07	07	07
08	A	08	08	08	08	08	08	08
09	A	09	09	09	09	09	09	09
10	A	10	10	10	10	10	10	10
11	A	11	11	11	11	11	11	11
12	A	12	12	12	12	12	12	12
13	A	13	13	13	13	13	13	13
14	A	14	14	14	14	14	14	14
15	A	15	15	15	15	15	15	15
16	A	16	16	16	16	16	16	16
17	A	17	17	17	17	17	17	17
18	A	18	18	18	18	18	18	18
19	A	19	19	19	19	19	19	19
20	A	20	20	20	20	20	20	20
21	A	21	21	21	21	21	21	21
22	A	22	22	22	22	22	22	22
23	A	23	23	23	23	23	23	23
24	A	24	24	24	24	24	24	24
25	A	25	25	25	25	25	25	25
26	A	26	26	26	26	26	26	26
27	A	27	27	27	27	27	27	27
28	A	28	28	28	28	28	28	28
29	A	29	29	29	29	29	29	29
30	A	30	30	30	30	30	30	30
31	A	31	31	31	31	31	31	31
32	A	32	32	32	32	32	32	32
33	A	33	33	33	33	33	33	33

FIGURE 4.

(c) RESOURCE REQUIREMENTS

For any given activity, there may be one or more RESOURCE CODE(S). These are listed in sequence corresponding to the given activity -- the first RESOURCE CODE is listed on the same line as the corresponding activity; each additional Resource is listed on each succeeding line.

(d) QUANTITY

The QUANTITY of the Resource required is listed corresponding to the specific RESOURCE TYPE CODE. Decimal fractions with one or two digits to the right of the decimal point may be used.

QUANTITY is taken as the average level of Resource application over the entire duration of the activity.

No entry in a corresponding COST REPORT will appear for a given activity where a RESOURCE entry is zero.

(e) SCHEDULED HOLD PRIOR TO ACTIVITY START

Use this section whenever it is desired to deliberately hold an activity for a specified number of workdays following completion of all its PREDECESSOR ACTIVITIES.

(f) WORKING TIME EXPENDED TO DATE

If workdays have already been spent on activity listed, then enter number of days spent here; otherwise, leave blank. Entry can be made in terms of whole days and in decimal fractions. If actual start and finish dates are known, use Form C-9 instead.

(g) WORKING TIME EXHIBIT REFERENCE

List EXHIBIT REFERENCE CODES here when

time estimates are variable.

(h) PERFORMANCE TO CONTINUE UNTIL THE
START OF ANOTHER ACTIVITY

Entry of ACTIVITY/MILESTONE CODE designated as the TARGET ACTIVITY is made here when it is necessary to extend the duration of one activity to the start of another (not necessarily an immediate successor in a given net). The entry is made on the same line as the ACTIVITY/MILESTONE CODE.

NOTE: The START of the TARGET ACTIVITY is defined for this purpose by the completion of all its PREDECESSORS, followed by the completion of any hold time specified for the TARGET ACTIVITY on FORM C-2.

(5) FORM C-2A (PROBABILISTIC AND CONDITIONAL SUCCESSORS)

ACTIVITY CODES for PROBABILISTIC SUCCESSORS along with their corresponding percentage probabilities are entered into columns where indicated. Codes for the activity designated a PROBABILISTIC SUCCESSOR are taken from FORM C-1 and entered in columns 10-17; one successor activity per line. Use as many lines as there are SUCCESSOR ACTIVITIES.

Beginning on the same line as the last listed PROBABILISTIC SUCCESSOR, go to the PREDECESSOR ACTIVITY CODES column, and enter ACTIVITY CODE(S) of those activities that precede this PROBABILISTIC SUCCESSOR or set of SUCCESSORS. If there is more than one PREDECESSOR ACTIVITY to the given SUCCESSOR, list their codes (taken from FORM C-1) using as many lines as are necessary.

If a group of PREDECESSOR ACTIVITIES is shown, the probability of branching to a specific group of SUCCESSOR ACTIVITIES should be shown just once, on the same line as the first PREDECESSOR ACTIVITY of the group.

ACTIVITY CODE(S) (from Form C-1)	PROBABILISTIC SUCCESSORS		CONDITIONAL SUCCESSORS		OTHERWISE (from Form C-1)	ALTERNATIVE SUCCESSOR ACTIVITY CODE(S) (from Form C-1)	PREDECESSOR ACTIVITY CODE(S) (one per line) (from Form C-1)	CARD SEQUENCE OR IDENTIFICATION (Optional)
	PERCENTAGE PROBABILITY	ACTIVITY CODE(S) (from Form C-1)	PROVIDED THAT	HAS (HAVE) BEEN "STARTED" OR "FINISHED"				
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								

FIGURE 5.

All sets of SUCCESSORS (PROBABILISTIC or CONDITIONAL) must have the same PREDECESSOR or set of PREDECESSORS and these relationships must be shown on FORM C-2 also, beginning on the same line as the last of the possible SUCCESSORS.

CONDITIONAL SUCCESSORS are those SUCCESSOR ACTIVITIES whose start is dependent upon the "START" or "FINISH" of another activity. If, for some reason, the specified activity has not "STARTED" or "FINISHED", an alternative SUCCESSOR ACTIVITY is listed. All ACTIVITY CODES are obtained from FORM C-1.

CARD SEQUENCE or IDENTIFICATION (optional):

(6) FORM C-2B (PROBABILISTIC AND CONDITIONAL
PREDECESSORS)

Enter on FORM C-2B those PREDECESSORS that have been defined as PROBABILISTIC or CONDITIONAL.

ACTIVITY CODE (taken from FORM C-1) for a designated activity with a set of PROBABILISTIC or CONDITIONAL PREDECESSORS is entered in the first column.

ACTIVITY CODES (taken from FORM C-1) of PROBABILISTIC PREDECESSOR ACTIVITIES and their corresponding PROBABILITIES are entered in column 3 and 2, respectively. Caution must be taken to insure that all PREDECESSOR ACTIVITIES in a set are complete before going on to another. Enter the probability just once for each set of PREDECESSORS (adjacent to the first predecessor of the set).

ACTIVITY CODES (taken from FORM C-1) for PREFERRED CONDITIONAL PREDECESSORS (or set of PREDECESSORS) are entered where indicated. Required conditions (i.e. the "START" or "FINISH" of another designated

ACTIVITY CODE (from Form C-1)	PROBABILISTIC PREDECESSORS		PREFERRED PREDECESSOR ACTIVITY CODE(S) (from Form C-1)	CONDITIONAL		PREDECESSORS		ALTERNATIVE PREDECESSOR ACTIVITY CODE(S) (from Form C-1)	CARD SEQUENCE OR IDENTIFICATION (Optional)														
	PERCENTAGE PROBABILITY	ACTIVITY CODE(S) (from Form C-1)		PROVIDED THAT:	HAS (HAVE) BEEN:	OTHERWISE																	
1	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
2	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
3	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
4	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
5	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
6	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
7	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
9	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
10	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
11	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
12	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
13	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
14	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
15	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
16	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
17	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
18	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
19	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
20	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
21	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
22	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
23	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
24	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
25	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
26	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
27	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
28	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
29	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
30	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
31	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
32	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
33	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33

FIGURE 6.

activity), are then listed on the same line as the last Predecessor of the set.

CARD SEQUENCE or IDENTIFICATION (optional)

(7) FORM C-3A (ACTIVITY TIME EXHIBIT)

This form for entry of ACTIVITY TIME EXHIBITS includes given percent probabilities for each of the three TIME ESTIMATES (Optimistic, Most Likely, and Pessimistic). Entered along with these time estimates are corresponding probabilities. These probabilities must add up to 100 percent.

TIME ESTIMATES are number of workdays measured from activity start to activity completion. Basic assumptions are that all Predecessors to the Specified Activity have been completed and that all required resources are available. If delay in the net occurs because of incomplete Predecessors or unavailability of resources, it will automatically be picked up by the computer.

TIME may be expressed in whole workdays and/or decimal fractions of a workday (i.e. 10 (days); 5.24 (days); 6.5 (days); .75 (days)). TIMES are expressed by an "OPTIMISTIC" or minimum value, "MOST LIKELY" and "PESSIMISTIC" or maximum value. They are defined as follows:

OPTIMISTIC VALUE--minimum time that the activity might take to complete. Minimal completion time would occur where no problems occur and the activity proceeds smoothly to completion with very little, if any difficulty.

MOST LIKELY VALUE--normal time taken to activity completion with typical but no unusual or difficult problems.

TRANSIM V INPUT DATA SHEET FORM C-3A (ACTIVITY TIME EXHIBITS)

(Use this form for exhibits which include probabilities)

Key: Punch data in shaded columns only when followed by user supplied data in the most (unshaded) field to the right

PROJECT

DATE

EXHIBIT NUMBER OR NAME (from Form C-2)	"OPTIMISTIC" TIME (see instructions)		"MOST LIKELY" TIME (see instructions)		"PESSIMISTIC" TIME (see instructions)		CARD SEQUENCE OR IDENTIFICATION (Optional)
	Percent Probability	Workdays	Percent Probability	Workdays	Percent Probability	Workdays	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
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17							
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31							
32							
33							

FIGURE 7.

PESSIMISTIC VALUE--maximum time taken to completion of an activity taking into consideration unusual problems causing some extensive difficulties resulting in major setbacks to activity completion.

It is preferable that there be a one-to-one correspondence between Exhibit Time References and Specified Activity. Doing so will eliminate the possibility that a change in time estimate made for one activity will not be mistakenly applied to another activity as well.

However, EXHIBIT TIMES may be referenced by more than one activity if it is so desired.

EXHIBIT NUMBER or NAME is taken from FORM C-2 and entered into the first column.

PROBABILITIES and corresponding time estimates are entered as indicated on the form and as specified earlier in this write-up (i.e. Optimistic, Most Likely, and Pessimistic).

CARD SEQUENCE or IDENTIFICATION (optional)

(8) FORM C-3B (ACTIVITY TIME EXHIBIT)

FORM C-3B is used when there are no PROBABILITY entries. It assumes that a modified triangular distribution is used wherein OPTIMISTIC and PESSIMISTIC TIME LEVELS are assumed to be at the 5% probability level, uniformly rising--on both sides--to a MOST LIKELY TIME VALUE at a maximum percentage of probability of its occurrence.

As stated for FORM C-3A, workdays are entered in whole days and/or in decimal fractions (i.e., 10, 5.2, .7, etc.).

(9) FORM C-3C (ACTIVITY TIME EXHIBIT)

This form is used for EXHIBITS containing TIME ESTIMATES with PROBABILITIES for the "OPTIMISTIC" and/or "PESSIMISTIC" times only. Obtain EXHIBIT NUMBER from FORM C-2.

NOTE: A modified triangular or house distribution is assumed wherein OPTIMISTIC and PESSIMISTIC TIMES may be unequal. For example, the OPTIMISTIC TIME of a given EXHIBIT may be 5% and a PESSIMISTIC TIME may be 10%. If both PROBABILITY entries at the ends are omitted from any EXHIBIT, then 5% will be assumed for both OPTIMISTIC and PESSIMISTIC PROBABILITY VALUES. However, if a PROBABILITY VALUE is entered at the OPTIMISTIC end only, it will be applied to the PESSIMISTIC side also. If a PROBABILITY VALUE is entered at the PESSIMISTIC end, the 5% default will be applied to the OPTIMISTIC end.

(10) FORM C-4A (RESOURCE POOL DATA AND RATE/COST TABLE)

This form lists RESOURCE CODES and DESCRIPTION along with total number initially available in the RESOURCE POOL and RATE

TRANSIM V INPUT DATA SHEET FORM C-38 (ACTIVITY TIME EXHIBITS)
(Use this form for exhibits containing time estimates without probabilities)

(A triangular distribution will be assumed)
Key puncher: Punch data in shaded columns only when followed by use supplied data in the next (unshaded) field to the right.

PROJECT _____

DATE _____

EXHIBIT NUMBER OR NAME (From Form C-2)	OPTIMISTIC TIME (see instructions) Workdays	MOST LIKELY TIME (see instructions) Workdays	PESSIMISTIC TIME (see instructions) Workdays	CARD SEQUENCE OR IDENTIFICATION (optional)
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10
11	11	11	11	11
12	12	12	12	12
13	13	13	13	13
14	14	14	14	14
15	15	15	15	15
16	16	16	16	16
17	17	17	17	17
18	18	18	18	18
19	19	19	19	19
20	20	20	20	20
21	21	21	21	21
22	22	22	22	22
23	23	23	23	23
24	24	24	24	24
25	25	25	25	25
26	26	26	26	26
27	27	27	27	27
28	28	28	28	28
29	29	29	29	29
30	30	30	30	30
31	31	31	31	31
32	32	32	32	32
33	33	33	33	33

FIGURE 8.

EXHIBIT NUMBER OR NAME (from Form C-2)	"OPTIMISTIC" TIME (see instructions) Percent Probability		"MOST LIKELY" TIME (see instructions) Workdays		"PESSIMISTIC" TIME (see instructions) Percent Probability		CARD SEQUENCE OR IDENTIFICATION (Optional)
	Workdays	Percent Probability	Workdays	Percent Probability	Workdays	Percent Probability	
1	X						1
2	X						2
3	X						3
4	X						4
5	X						5
6	X						6
7	X						7
8	X						8
9	X						9
10	X						10
11	X						11
12	X						12
13	X						13
14	X						14
15	X						15
16	X						16
17	X						17
18	X						18
19	X						19
20	X						20
21	X						21
22	X						22
23	X						23
24	X						24
25	X						25
26	X						26
27	X						27
28	X						28
29	X						29
30	X						30
31	X						31
32	X						32
33	X						33

FIGURE 9.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

or COST PER RESOURCE UNIT (per day or hour and effective from a specified workday).

As mentioned before, like the ACTIVITY CODE, the RESOURCE TYPE NAME or CODE must consist of a minimum of two and a maximum of eight contiguous alpha-numeric characters.

DESCRIPTION is optional, but if to be listed, it is preferable to enter it exactly as it appears in the RESOURCE REPORT TITLE. The RESOURCE DESCRIPTION may consist of any combination of alpha-numeric characters and blank spaces.

The NUMBER of RESOURCE UNITS initially available in the pool (from which the requirements of individual activities will be drawn) may be expressed as an integer number or as a decimal number with one or two digits to the right of the decimal point (hundredths of units). Care must be taken to insure that the QUANTITY is large enough to meet the demands of any individual activity drawing from that pool, because no activity is allowed to begin until all of its resource requirements are available. If two or more activities require resources from the same pool and there are not enough resource units available to allow simultaneous performance of all those activities, then the resources will be allocated to as many activities as possible, with preference given to those activities that have been waiting the longest; i.e. those whose PREDECESSOR ACTIVITIES were all completed at the earliest times. In no case will the number of resource units assigned to an activity be less than the number shown as "required" on FORM C-2.

RATE/COST PER RESOURCE UNIT. Enter dollar amount of cost per RESOURCE UNIT on a daily (D) or hourly (H) rate.

RATE/COST EFFECTIVE FROM DATE. Enter DATE (day, month, year) that the RATE or COST is effective. If COST/RATE remains the same, leave blank.

If COST/RATE changes, list beginning COST/RATE per resource unit. Then, on the next line, list new COST/RATE and in its corresponding column, enter in the date that this new rate is effective.

CARD SEQUENCE or IDENTIFICATION (optional)

As previously mentioned (See Brief on FORM C-1).

(11) FORM C-9 (COMPLETED AND/OR UNDERWAY ACTIVITIES ONLY).

Enter ACTIVITY CODE of given ACTIVITY taken from FORM C-1 as indicated. For COMPLETED ACTIVITIES, enter START and COMPLETION DATES, as indicated.

For UNDERWAY ACTIVITIES, enter START DATE and DATE OF UPDATE. Then, enter an EXHIBIT REFERENCE for the estimated Time to Completion.

RESOURCE REQUIREMENTS should be entered on this form even if they are the same as those already entered on FORM C-2. Then the C-2 entry should be deleted.

RESOURCE TYPE NAMES or CODES must correspond to FORM C-4A. For any given activity, there may be one or more RESOURCE CODE(S). These are listed in sequence following their corresponding activity.

If ACTIVITY PERFORMANCE of the SPECIFIED ACTIVITY is to continue to the start of another activity, enter in designated column the appropriate ACTIVITY CODE (taken from FORM C-1).

[illegible]

FIGURE 11.

(12) FORM C-10 (GENERAL)

The UPDATE line is used to establish an overall "date of update" for the run. The number of workdays actually spent on each individual activity to date may be entered in the appropriate columns on FORM C-2. The actual START DATE and DATE OF UPDATE may be entered on FORM C-9.

The TIME PERIOD LINE is used to determine the time scaling of the output reports. The time period is normally set equal to one workday; however, on lengthy projects, it is often desirable to have the reports somewhat condensed. For example, in a lengthy project where one workweek equals five workdays, the time period might be specified as five workdays, resulting in presentation of all output reports in terms of five-day (workweek) intervals.

The NUMBER OF RESOURCE UNIT HOURS PER RESOURCE UNIT WORKDAY refers to the number of hours worked per day (8, 16, 24, etc.) as presented in the RESOURCE UTILIZATION HISTORY REPORT. The keyword, "ITERATIONS" is used to specify the number of successive iterations or project network simulations desired.

If multiple copies are specified, the total requested for each report will be printed before going on to the next report.

Additional instructions for desired format and editing options are listed next. Options not utilized should be crossed out.

Analysis: follow instructions below:

II-37

FIGURE 12.

(13) FORM C-10A (RISK REPORT SPECIFICATIONS)

If a SCHEDULE RISK REPORT is desired, enter "YES" in the space (columns 22-24) allocated next to SCHEDULE RISK REPORT. If "NO", enter "NO" and go to the next form.

SORT OPTIONS for the SCHEDULE RISK REPORT are listed on the form. Cross out the options NOT desired and enter number of desired copies.

Enter ACTIVITY/MILESTONE CODES (taken from FORM C-1) of Activities to be included in the Risk Report. List the corresponding "LEAD RESPONSIBILITY" which is the first Responsibility listed for each designated Activity. Enter APPROVED SCHEDULE DATE and designate as indicated on this form the type of approved schedule date ("B" entered if it is an Activity Beginning Date; "C" entered for Activity Completion Date; and "M" for Milestone Date).

Enter ACCEPTABLE LEVEL OF RISK as given in percentages.

For specified ACTIVITIES(MILESTONES), a punched output deck can be produced and will have the following information:

- o Activity/Milestone Code
- o Approved Schedule Date
- o Probability of Meeting Approved Schedule Date
- o Acceptable Risk Level
- o Date of Meeting Acceptable Risk Level
- o Percent Criticality

For subsequent runs, the punched deck should be inserted before the "GO" card of the Input Deck.

PROJECT

DATE _____

[* Enter number only if this number differs from previously specified number; of copies of output report(s) to be printed]

Analyse Fall in Block:

[illegible]

FIGURE 13.

(14) FORM C-11 (TIME SUMMARY GRAPHS)

TIME SUMMARY GRAPHS present a histogram of the range of possible elapsed times between specified activities or milestones, or a distribution of start or finish times for a given activity.

It is possible to enter data for two TIME SUMMARY GRAPHS on this form. Enter title of Time Summary Graph to be obtained (lines 1 and 14). Additional data is entered on the next twelve lines where indicated.

TIME SUMMARY GRAPHS are presented in terms of calendar dates only if calendar information is included on FORM C-0 and if a starting activity is not given; otherwise, the report is presented in terms of workdays (or if specified on FORM C-10, in time periods).

If the distribution specifications are not given, the computer will scale the distribution automatically to fit on a single page. Otherwise, the computer will use as many pages as are required to meet the specifications.

For runs in which the number of iterations is greater than 100, fractional percentage occurrences within any interval will be rounded upward or downward to the nearest percent; for example, a 1-in-250 occurrence will be rounded to 0% and will not appear on the graph.

*Enter number only if this number differs from previously specified number of copies of output report(s) to be printed)

[illegible]

FIGURE 14.

(15) FORM C-12 (CRITICALITY, DELAY, PROB-
ABILITY OF OCCURRENCE AND SCHEDULE REPORT)

SORT OPTIONS are as listed below each report heading. You may specify SORT OPTIONS to be utilized and number of copies desired. If it is desired to suppress printing of the portion of the ACTIVITY CRITICALITY REPORT covering activities whose criticality is below a specified percent, enter that CRITICALITY PERCENT in lines 4 and/or 9. A report listing those activities that are delayed for lack of available resources will be automatically printed. Conversely, even though an activity may fail to be executed in all iterations due to Probabilistic and/or Conditional Branch Rules, a report covering this situation will not be printed unless requested on this form.

If an ACTIVITY SCHEDULE TABULATION is requested and no SORT is specified, one complete schedule tabulation will be printed and listed (sorted) according to Activity Code. Additional sorting can be obtained by specifying the keyword "SORT" followed by one or more of the following keyword combinations:

EARLIEST START
EXPECTED START
LATEST START
EARLIEST FINISH
EXPECTED FINISH
LATEST FINISH

The ACTIVITY SCHEDULE GRAPH is presented in order of EARLIEST START TIMES. If multiple pages are printed due to the number of

activities and/or the length of the project, they will be designated in the upper right hand corner, as follows:

A1	B1	C1	
A2	B2	C2	
A3	B3	C3	etc.

and may be taped together accordingly for presentation purposes. Only one copy of the ACTIVITY SCHEDULE GRAPH and DESCRIPTION FOR GRAPH may be obtained.

(16) FORM C-13A (SCHEDULE TABULATION GRAPH AND STATUS REPORTS FOR RESPONSIBILITY GRAPH)

Selected ACTIVITY SCHEDULE TABULATION GRAPH and STATUS REPORTS for activities corresponding to one or more RESPONSIBILITY CODES may be specified following the keyword, "RESPONSIBILITY." Enter RESPONSIBILITY CODES for reports required as indicated in instructions on the form.

If a report is desired for each RESPONSIBILITY CODE, simply enter "ALL". If no report is required, leave the blanks unfilled.

Separate ACTIVITY STATUS REPORTS may be obtained for each of the designated responsibilities, covering "ACTIVITIES UNDERWAY," "DUE TO START," and "DUE TO COMPLETE," within the specified time period(s).

(17) FORM C-14 (RESOURCE REPORTS)

Each RESOURCE CODE appearing on this form should have a corresponding entry on FORM C-4A. A given RESOURCE CODE specified should appear only once on FORM-14.

TRANSIM V INPUT DATA SHEET FORM C-14 (RESOURCE REPORTS)

EXPANDED: On this form, do NOT punch data in shaded columns.
 (* Enter number only if this number differs from previously specified number of copies of output report(s) to be printed)

PROJECT _____ DATE _____

Analyst follow instructions below

CARD SEQUENCE OR IDENTIFICATION		DATE	
74	75	76	77
01	02	03	04
05	06	07	08
09	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72

RESOURCE CODE(S): (IF REPORTS ARE DESIRED FOR EACH RESOURCE CODE, ENTER THE WORD "ALL" IN ONE OF THE BLANKS BELOW. IF NO REPORTS ARE DESIRED, LEAVE THE BLANKS UNFILLED)

RESOURCE UTILIZATION HISTORY

ACTIVITY MILESTONE DESCRIPTION FOR GRAPH (YES OR NO?)

INTERVAL WIDTH FOR RESOURCE REQUIREMENTS GRAPH (YES OR NO?)

RESOURCE CODE(S): (LIST RESOURCE CODE(S) FOR WHICH THE REPORT OPTIONS DIFFER FROM THE OPTIONS SPECIFIED ABOVE)

RESOURCE UTILIZATION HISTORY

ACTIVITY MILESTONE DESCRIPTION FOR GRAPH (YES OR NO?)

INTERVAL WIDTH FOR RESOURCE REQUIREMENTS GRAPH (YES OR NO?)

FIGURE 17.

By default, if interval width for the RESOURCE GRAPH is not specified, the vertical axis (number of units) will be automatically scaled to the height of a single page. The horizontal axis (workdays, time periods, or calendar dates) will be scaled according to the length of the project and may extend over several pages.

If more than one page is required due to the number of resources and/or length of the project, they will be designated in the upper right hand corner as follows:

A1	B1	C1
A2	B2	C2
A3	B3	C3

These can be taped together accordingly for presentation purposes.

(18) FORM C-15A (RESOURCE SUMMARY REPORTS)

Information listed on FORM C-15A includes the title of the RESOURCE SUMMARY REPORT, specification of those RESOURCE CODES to be added or subtracted, and units in which these items are to be defined.

Resulting reports include an AGGREGATE RESOURCE HISTORY, HISTORY GRAPH, and DESCRIPTION FOR A HISTORY GRAPH.

This form is also used to obtain COST REPORTS for those resources to which a COST RATE is assigned on FORM C-4A.

Analyst follow instructions below

CARD SEQUENCE OR IDENTIFICATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
2	RESOURCE SUMMARY REPORT																																
3	TITLE																																
4	SPECIFY RESOURCE CODES WHICH ARE TO BE ADDED. (A)																																
5	IF ALL RESOURCE CODES ARE TO BE AGGREGATED, ENTER THE WORD "ALL"																																
6	IN ANY ONE OF THE BLANKS BELOW:																																
7																																	
8																																	
9																																	
10																																	
11																																	
12																																	
13																																	
14	SPECIFY RESOURCE CODES WHICH ARE TO BE SUBTRACTED FROM ABOVE																																
15	AGGREGATION. (B)																																
16																																	
17																																	
18																																	
19																																	
20																																	
21																																	
22																																	
23	REPORT NET BALANCE (A-B) IN () UNITS (I.E. DOLLARS, GALLONS, TONS																																
24	Etc. IF NOTHING SPECIFIED UNITS WILL BE ASSUMED.																																
25	AGGREGATE RESOURCE HISTORY (YES OR NO?) # COPIES																																
26	PERCENTILE(S) FOR HISTORY ()																																
27	PERCENTILE(S) FOR CUMULATIVE HISTORY ()																																
28	AGGREGATE RESOURCE HISTORY GRAPH (YES OR NO?)																																
29	ACTIVITY DESCRIPTION FOR HISTORY GRAPH (YES OR NO?)																																
30	INTERVAL WIDTH FOR HISTORY GRAPH (IF WIDTH NOT SPECIFIED, GRAPH																																
31	WILL BE SCALED VERTICALLY TO FIT ON A SINGLE PAGE)																																
32	AGGREGATE RESOURCE SUMMARY GRAPH (YES OR NO?) # COPIES																																
33	INTERVAL WIDTH FOR SUMMARY GRAPH (REFER TO LINES 30 AND 31)																																

FIGURE 18.

C. COMPUTER OPERATIONS.

1. Data Deck Structure.

The card deck or input file prepared from the pre-coded forms and submitted to the computer may consist of any number of separate segments, but must always be in the following sequence.

a. Control Cards.

These cards are unique to the particular computer installation. They direct the computer to allocate the necessary requirements (i.e. storage, running time, etc.) to run the package. Control cards convey the following minimum information:

- o Account number.
- o Unique "job" identification and/or sequence number.
- o Machine time and/or output limits (number of lines and/or pages).
- o Identification of the program version to be run.
- o Amount of computer storage to be allocated.

b. TRANSIM V Input Forms.

The remaining information to be "input" into the system for computer identification and analysis are to be taken from the following forms in this sequence only:

C-0, C-1, C-1A, C-2, C-9, C-2A and/or C-2B, C-4A,
C-3A and/or C-3B and/or C-3C, C-10, C-10A, C-11,
C-12, C-13A, C-14, C-15A

For a project involving separate networks, each drawing from a common resource pool, the data forms (C-1, C-1A, C-2 and C-9) for each of these subnetworks must be grouped together and introduced by a card using the following format.

(Cols. 1-7)	(Col. 8)	(Cols. 9-70)
NETWORK	space	TITLE OF NETWORK

As shown above, the keyword* "NETWORK" is followed by a space and then by the "TITLE OF THE NETWORK."

NOTE: For a single network, ignore the above. Specifications of a network name is optional; it will be treated as "NETWORK" by default.

c. Final Card(s).

The final card of the input data deck will include the word "GO." The word can be punched anywhere within Columns 1-72 inclusively.

A "GO" card will permit simulation to proceed if there are no "FATAL" errors found in the input deck.

* A TRANSIM V keyword is any word or set of contiguous characters which is preprinted on the input data forms.

2. How to Estimate Computer Running Time.

The running time for any given network varies widely from one computer installation to another due to inherent differences in the operating characteristics of different computer systems. The best guide to running time for a particular network is therefore a comparison to the time requirements of other networks run at the same computer installation.

In general, the following guidelines apply in all cases:

- o The running time is always made up of three basic segments:

The time to edit the input data

The time to simulate the network

The time to generate the reports

- o The time required for input data editing is roughly proportional to the number of cards comprising the input data deck. The time required for simulation is proportional to the number of activities in the network multiplied by the number of iterations while the time required to generate the reports is roughly proportional to the number of pages of the reports produced.

It should be noted that the most significant factor in determining the running time for all but the smallest networks, is the number of iterations. Therefore, it is generally recommended that the number of iterations be held to 100 or less for all test runs, and increased beyond 100 only where necessary for statistical (sample size) reasons.

In general, it can be stated that for typical networks, the computer time required for editing the input data and generating the reports is roughly equal to one half the time required for 100 iterations. Increasing the number of iterations to 200 would therefore increase the running time by 50 percent.

D. OUTPUT REPORTS AND THEIR USE.

TRANSIM V Output Reports are presented in a variety of formats, as specified on the input data sheets. Examples of each are given in this section.

1. SEQUENCE OF REPORTS.

Regardless of which and how many reports are specified, the TRANSIM V output reports will always appear in the following sequence:

- o List of Names Used in the Model (always printed)
- o Summary of Number of Words Data Storage Used (always printed)
- o Schedule Risk Report
- o Time Summary Graph
- o Criticality Analysis Report
- o Activity Criticality Report
 - With Predecessors, sorted by Activity/Milestone Code and/or Decreasing Criticality
 - With Successors, sorted by Activity/Milestone Code and/or Decreasing Criticality
- o Activities Delayed Awaiting Resources
- o Activity/Milestone Probability of Occurrence Report
- o Activity/Milestone Schedule, sorted by
 - Activity/Milestone Code and/or
 - Earliest Start Times and/or
 - Expected Start Times and/or

- Latest Start Times
and/or
- Earliest Finish Times
and/or
- Expected Finish Times
and/or
- Latest Finish Times
- o Activity Schedule Graph
- o Activity Code and Description for
Schedule Graph
- o Resource Utilization History
- o Resource Requirements Graph
 - Schedule
 - Summary
- o Activity Code and Description for
Resource Requirements Graph
- o Aggregate Resource History
- o Aggregate Resource History Graph
 - Schedule
 - Summary
- o Activity Code and Description for Aggregate
Resource History Graph
- o Cumulative Aggregate Resource History
Graph
- o Aggregate Resource Summary Graph
- o Activity Status Reports
 - Activities Underway for Responsibility
 - Activities Due to Start
 - Activities Due to Complete

2. LIST OF NAMES USED IN THE MODEL.

All TRANSIM V output defines the type of entities used in the model to be analyzed. These may include:

- o Operating Element
- o Traffic Unit Type
- o Table Name
- o Rule Name
- o Group Code
- o Activity Code
- o Resource Code
- o Responsibility Code

Names are listed and the appropriate column is checked. More than one column may be checked; for example, the same NAME may be used for both an Activity and a Table Name (See Figure 19).

3. SUMMARY OF USED DATA STORAGE.

This section summarizes the actual usage of computer storage. It may be used to estimate internal data storage requirements as specified in TRANSIM V Input Data FORM C-0 (See Figure 20).

4. SCHEDULE RISK REPORT.

The SCHEDULE RISK REPORT (See Figure 21) lists the probability that each specified activity will meet its Approved Schedule Date. The report lists Activity/Milestone Codes and Descriptions along with corresponding Percent Criticality and Lead Responsibility.

For example, a 5% probable level of risk is entered in the Acceptable Risk Level column. The computer reports the date that meets this level of acceptable risk, and in the next column (Deficit or

LIST OF NAMES USED IN THIS MODEL

NAME	OPERATING ELEMENT	TRAFFIC UNIT	TYPE NAME	GROUP CODE	ACTIVITY NAME	RESPONSIBILITY CODE
9						
8						
7						
6						
5						
4						
3						
2						
1						
22						
21						
20						
19						
18						
17						
16						
15						
14						
13						
12						
11						
10						
09						
08						
07						
06						
05						
04						
03						
02						
01						
180						
SHQP-45						
SHQP-44						
SHQP-43						

Figure 19. List of Names Used in This Model.

THE MAXIMUM NUMBER OF WORDS DATA STORAGE USED WAS 17179 OUT OF AN AVAILABLE 35328 WORDS.

AT PRESENT 174 WORDS USED FOR SERVICE TIME TABLES.

0 WORDS USED FOR SUMMARY REPORT INDEXING.

1213 WORDS USED FOR SUMMARY REPORT WORKING AREA.

1213 WORDS USED FOR ACTIVITIES OF RESPONSIBILITIES.

108 WORDS USED FOR RESOURCE POOLS.

8226 WORDS USED FOR RESOURCE UTILIZATION REPORTS.

279 WORDS USED FOR RISK REPORTS.

1137 WORDS USED FOR TIME SUMMARY GRAPHS.

25 WORDS USED FOR DELAY REPORTS (ACTIVITIES DELAYED AWAITING RESOURCES).

0 WORDS USED FOR SUMMARY REPORT EVENT NOTICES.

0 WORDS USED FOR LOAD SUMMARY REPORT DISTRIBUTIONS.

0 WORDS USED FOR TIME SUMMARY REPORT DISTRIBUTIONS.

THIS IS NOT A COMPLETE LISTING OF ALL THE DATA STORAGE USED.

END OF SIMULATOR OUTPUT. MESSAGES OF FOLLOWING PAGES ARE PRINTED BY THE OPERATING SYSTEM OF THIS COMPUTER INSTALLATION.

Figure 20. Summary of Number of Words Data Storage Used.

BOILER REPAIR MODEL (14FEB77)

SCHEDULE RISK REPORT (LISTED ACCORDING TO ACTIVITY/MILESTONE CODE)

APPROVED SCHEDULE DATE : B = ACTIVITY BEGINNING DATE, C = ACTIVITY COMPLETION DATE, M = MILESTONE DATE
 + (SCHEDULE) = THE DATE OF MEETING ACCEPTABLE RISK LEVEL IS (EARLIER) THAN APPROVED SCHEDULE DATE
 - (DEFICIT) = THE DATE OF MEETING ACCEPTABLE RISK LEVEL IS (LATER) THAN APPROVED SCHEDULE DATE

(*** CHANGE IN DATE OF MEETING ACCEPTABLE RISK LEVEL :
 * = THE DATE IN CURRENT RUN IS (EARLIER) THAN THE DATE IN LAST RUN
 - = THE DATE IN CURRENT RUN IS (LATER) THAN THE DATE IN LAST RUN)

IDENTIFICATION OF LAST REPORT (RUN TITLE) BOILER REPAIR TEST MODEL 1FEB77

ACTIVITY / MILESTONE	PERCENT CRITIC- CALITY	LEAD RESERVE	APPROVED SCHEDULE DATE	PROB OF MEETING DATE	ACCEPTABLE RISK LEVEL	DATE OF MEETING LEVEL	DEFICIT OR SURPLUS (WORK- SCHEDULE DAYS)	PROB OF MEETING APPROVED RISK LEVEL	PER- CENT CRITIC- CALITY
CUDE									
12 FINISH REPAIR BOILER RIGGE CASTING	47	YARD	(C) 19MAY77	39 P	5 P 28JUN77	- 27	- 21 P	- 11	8
13 REMOVE SHELF AND INSTALL STUD TUBES	8	YARD	(B) 25MAR77	92 P	5 P 20MAR77	- 16	- 4 P	- 7	0
15 REMOVE PREP AND INSTALL ECONOMIZE TUBES	4	YARD	(C) 12APR77	59 P	5 P 4MAY77	- 16	- 20 P	- 7	1
16 INSTALL DRUM INTERNALS	4	YARD	(B) 22APR77	100 P	5 P 29APR77	- 19	- 0 P	- 2	0
20 INSTALL PLASTIC REFRACTORY	34	YARD	(C) 10MAY77	0 P	5 P 14JUN77	- 94	- 0 P	- 7	0
28	45	YARD	(C) 10FEB77	0 P	5 P 21JUN77	- 93	- 0 P	- 8	1
30	100	YARD	(B) 27MAY77	56 P	5 P 21JUN77	- 17	- 33 P	- 9	0
END			(H) 14MAY77	0 P	5 P 21JUN77	- 84	- 0 P	- 9	0

Figure 21. Schedule Risk Report.

Surplus Workdays), lists the number of days ("+" (surplus) = the date of meeting acceptable risk level earlier than Approved Schedule Date; "-" (deficit) = the date of meeting acceptable risk level is later than the Approved Schedule Date) between the Acceptable Risk Date and the Approved Schedule Date.

If the report has been updated, another section consisting of an additional three columns is created. These columns list the differences between the current and previous runs, with respect to the probability of meeting the Approved Schedule Date, the DEFICIT or SURPLUS Workdays, and activity criticality.

5. TIME SUMMARY GRAPH.

The TIME SUMMARY GRAPH (See Figure 22) can be obtained for overall project time as well as for the start and/or finish times of a specific activity, or for the elapsed time between activities.

Distributions are automatically scaled to fit a single page if these specifications are not given. If they are, the computer will use as many pages as it required to meet the specifications.

6. CRITICALITY ANALYSIS REPORT.

The CRITICALITY ANALYSIS REPORT (See Figure 23) simply lists the number of activities/milestones in decreasing order of criticality. A Criticality Distribution of the total number of activities/milestones in increments of 10 percentiles starting from zero percentile (which identifies noncritical activities/milestones) is printed.

FINISH OF ELK MILLS PROJECT

LATEST DATE : 18 FEB 80
 EXPECTED DATE : 1 OCT 79
 EARLIEST DATE : 14 MAY 79

DATE	INTERVAL	X = PERCENT PROBABILITY (ROUNDED)	C = CUMULATIVE PERCENT PROBABILITY
13 MAY 79	OR EARLIER	1	1
14 MAY 79	THRU 22 MAY 79	1	1
23 MAY 79	THRU 31 MAY 79	1	1
1 JUN 79	THRU 9 JUN 79	1	1
10 JUN 79	THRU 18 JUN 79	1	1
19 JUN 79	THRU 27 JUN 79	1	1
28 JUN 79	THRU 6 JUL 79	1	1
17 JUL 79	THRU 15 JUL 79	1	1
18 JUL 79	THRU 22 JUL 79	1	1
25 JUL 79	THRU 2 AUG 79	1	1
3 AUG 79	THRU 11 AUG 79	1	1
12 AUG 79	THRU 20 AUG 79	1	1
21 AUG 79	THRU 29 AUG 79	1	1
30 AUG 79	THRU 7 SEP 79	1	1
17 SEP 79	THRU 16 SEP 79	1	1
26 SEP 79	THRU 25 SEP 79	1	1
1 OCT 79	THRU 13 OCT 79	1	1
14 OCT 79	THRU 23 OCT 79	1	1
23 OCT 79	THRU 31 OCT 79	1	1
1 NOV 79	THRU 9 NOV 79	1	1
10 NOV 79	THRU 18 NOV 79	1	1
19 NOV 79	THRU 27 NOV 79	1	1
28 NOV 79	THRU 6 DEC 79	1	1
7 DEC 79	THRU 15 DEC 79	1	1
16 DEC 79	THRU 23 DEC 79	1	1
24 DEC 79	THRU 31 DEC 79	1	1
31 DEC 79	THRU 7 JAN 80	1	1
14 JAN 80	THRU 20 JAN 80	1	1
21 JAN 80	THRU 29 JAN 80	1	1
30 JAN 80	THRU 7 FEB 80	1	1
10 FEB 80	THRU 16 FEB 80	1	1
17 FEB 80	THRU 25 FEB 80	1	1
24 FEB 80	THRU 3 FEB 80	1	1

Figure 22. Time Summary Graph.

BOILER REPAIR TEST DATA 25AUG77

CRITICALITY ANALYSIS REPORT

(COMPLETED ACTIVITIES/MILESTONES ARE EXCLUDED FROM THIS REPORT)

TOTAL NUMBER OF ACTIVITIES/MILESTONES : 26

NUMBER OF CRITICAL ACTIVITIES/MILESTONES : 21 (81 PERCENT)

CRITICALITY PERCENT -----	NUMBER OF ACTIVITIES/MILESTONES -----	PERCENT OF TOTAL -----
91 THRU 100	2	8
81 THRU 90	0	0
71 THRU 80	0	0
61 THRU 70	1	4
51 THRU 60	5	19
41 THRU 50	0	0
31 THRU 40	2	8
21 THRU 30	0	0
11 THRU 20	5	19
1 THRU 10	6	23
0	5	19

Figure 23. Criticality Analysis Report.

Additional information listed on this report is as follows:

- o Total Number of Activities/Milestones
- o Number of Critical Activities/Milestones
(along with percent critical)

7. ACTIVITY CRITICALITY REPORT.

The ACTIVITY CRITICALITY REPORT describes the criticality of an activity in the given network. Criticality of an activity is the percent probability that the given activity will be on the Critical Path --defined as the sequence of activities that takes the longest time from Starting Activity to Finish Activity.

The ACTIVITY CRITICALITY REPORT may be obtained with either Predecessor or Successor Activities. The report may be sorted either by (1) Activity/Milestone Code, or (2) By Decreasing Criticality. Figure 24 is an Activity Criticality Report with Predecessors--Listed According to Decreasing Criticality.

ACTIVITY STATUS is coded as follows:

"*" indicating a Completed Activity, or

"+" indicating an Underway Activity.

These indicators are printed in front of the relevant Activity Description.

ACTIVITY CODES and DESCRIPTIONS of the specified activity and its Predecessor(s) or Successor(s) Activity(ies) are listed with their corresponding Criticality Percent. Activity Expected Slack Time (in Workdays), is listed for the Predecessor or Successor to which it corresponds. More than one report may be printed.

- ERECTION SEQ. SCH. COLR-A001(MEM.LIKELY; 2-9-67)

ACTIVITY CRITICALITY REPORT WITH PREDECESSORS (LISTED ACCORDING TO DECREASING CRITICALITY)

ACTIVITY		PREDECESSOR ACTIVITIES		CRITICALITY (PERCENT)		CRITICALITY (PERCENT)		EXPECTED SLACK (WORKDAYS)	
CODE	DESCRIPTION	PM-048	CODE	DESCRIPTION	PM-045	PM-044	PM-047		
04908984	START BUILDERS TRIALS	100	3199049	COMP LTG SYS	0	0	0	20.63	
			4239049	COMP NAV-ELEX-ORD OPER TSTG	0	0	0	21.25	
			84300049	INCLINING	100	100	100	0.0	
04909089	COMP ACCEPTANCE TRIALS	100	98202049	ACCEPTANCE TRIALS	100				
04910013	DELIVERY	100	98999049	PRE-OUTFITTING DELIVERY	100				
63199997	FINAL PAINT ALL AREAS	100	99702631	2ND DRYDOCK	100				
81306000	COMP SCHEDULED EVENT 1979-1980	100	04910013	DELIVERY	100				
84300049	INCLINING	100	98205833	FUEL SHIP	100				
98201997	DOCK TRIALS	100	19299982	COMP AIR TESTING FINAL	0				103.46
			20099982	EQUIP REMOVAL & REPLACEMENT DEMO	4				16.04
			32199982	COMP PWR DISTR SYS	7				14.00
			43199982	COMP IC SYS	10				11.75
			50055982	FINAL INST/TST MISC PPG ST 2-5	0				40.13
			31299982	FOREMATIC SYS ALL AREA OPER TST	20				6.04
			98409982	STAGE 6 DOCKSIDE TESTING	59				90.08
98202049	ACCEPTANCE TRIALS	100	98407982	STAGE 7 TESTING ALL SYS	100				2.46
98205843	FUEL SHIP	100	99499982	CLEAN SHIP FOR INCLINING	100				
98407982	STAGE 7 TESTING ALL SYS	100	04908984	START BUILDERS TRIALS	100				
98999049	PRE-OUTFITTING DELIVERY	100	04909989	COMP ACCEPTANCE TRIALS	100				
99499982	CLEAN SHIP FOR INCLINING	100	95720994	UNDOCK	100				
99702631	2ND DRYDOCK	100	98201997	DOCK TRIALS	100				
99720994	UNDOCK	100	63199997	FINAL PAINT ALL AREAS	100				
04905999	LAUNCH	97	04904049	COMP HULL ASSEMBLY	10				5.21
			19290049	LAUNCH TO TEST MOUNT APNDGS	20				15.04
			19290049	LAUNCH READINESS TSTG	22				19.03
			41611049	ALIGNBORE RUDDER-INST CLSG PL	0				11.29
			52450049	INST SHFT LOCK&COMP PRE-LAUNCH	65				1.54

Figure 24. Activity Criticality Report (with Predecessor--Listed According to Decreasing Criticality).

8. ACTIVITIES DELAYED AWAITING RESOURCES.

This report (See Figure 25) lists those activities (by Code and Description) with corresponding criticality (percent), delay time (workdays or specified time units), Awaiting Availability of All Resources (minimum, expected, and maximum), and Total Resource Requirements (code and number required).

Activity Status is indicated by "*" for Completed; "+" for Underway.

9. ACTIVITY/MILESTONE PROBABILITY OF OCCURRENCE REPORT.

This report (See Figure 26) lists by Code and Description those Activities/Milestones with more than zero percent probability of occurrence. Corresponding Percent Criticality and Probability of Occurrence are listed after their Activity/Milestone Code in one of two columns: 100 Percent and Less Than 100 Percent.

10. ACTIVITY/MILESTONE SCHEDULE.

The ACTIVITY/MILESTONE SCHEDULE (See Figure 27) can be listed according to seven different sorts. These are:

- o Activity/Milestone Codes
- o Earliest Start Times
- o Expected Start Times
- o Latest Start Times
- o Earliest Finish Times
- o Expected Finish Times
- o Latest Finish Times

More than one report may be printed. The user may want an Activity/Milestone Schedule printed according to more than one sort.

(CONTINUED)

ACTIVITIES DELAYED AWAITING RESOURCES (LISTED ACCORDING TO ACTIVITY CODE)

(** AVERAGE DAILY RESOURCE UNITS REQUIRED)

ACTIVITY CODE	ACTIVITY DESCRIPTION	CRITICALITY (PERCENT)	DELAY TIME (WORKDAYS) AWAITING AVAILABILITY OF ALL RESOURCES		TOTAL RESOURCE REQUIREMENTS	
			(MIN)	(MAX)	(CODE)	(UNITS)**
63807G07	REMOVE DECK GRATING	20	0.08	4.04	22.92	MEN 8.78
63807G08	REMOVE DECK GRATING	5	0.58	2.38	9.63	MEN 8.57
63807G09	INSTALL REEFER PLANTS	0	0.0	3.17	14.50	MEN 6.26
63808G03	REMOVE GRATING DECK	0	0.0	3.38	10.50	MEN 9.86
63808G04	REMOVE GRATING DECK	0	0.0	2.50	7.75	MEN 9.23
63808G05	REMOVE GRATING DECK	5	0.25	2.50	7.04	MEN 8.89
63809G07	REMOVE OVERHEAD GRATING	10	0.08	3.38	9.71	MEN 8.47
63809G08	REMOVE OVERHEAD GRATING	30	0.34	4.29	21.83	MEN 9.89
63809G09	INSTALL REFRID PIPING	0	0.0	0.96	3.08	MEN 3.60
63809G03	REMOVE GRATING OVERHEAD	5	0.0	2.42	7.75	MEN 9.00
63809G04	REMOVE GRATING OVERHEAD	0	0.0	1.92	6.83	MEN 8.67
63809G05	REMOVE GRATING OVERHEAD	0	0.0	2.71	15.13	MEN 8.78
63809G07	REMOVE BULKHEADS	30	0.0	0.21	0.88	MEN 6.19
63809G08	REMOVE BULKHEAD	35	0.0	0.29	1.58	MEN 3.90
63809G09	INSTALL LIGHTING	0	0.0	0.75	3.50	MEN 7.23
63810G07	400 DUCTS	10	0.0	0.25	0.67	MEN 5.28
63810G08	400 DUCTS	15	0.0	0.25	0.96	MEN 6.94
63810G09	CHARGE PIPING	0	0.0	0.33	1.67	MEN 4.71
63811G03	REMOVE INSULATION DECK	0	0.0	0.42	1.41	MEN 8.67
63811G04	REMOVE INSULATION DECK	0	0.0	0.71	2.42	MEN 8.78

Figure 25. Activities Delayed Awaiting Resources (Listed According to Activity Code).

ACTIVITY/MILESTONE PROBABILITY OF OCCURRENCE REPORT (LISTED ACCORDING TO ACTIVITY/MILESTONE CODE)
(ACTIVITIES/MILESTONES WITH ZERO PERCENT PROBABILITY OF OCCURRENCE ARE DELETED FROM THIS AND ALL OTHER REPORTS)

CODE	ACTIVITY / MILESTONE DESCRIPTION	PERCENT CRITICALITY	PROBABILITY OF OCCURRENCE	
			100 PERCENT	LESS THAN 100 PERCENT
01	START	100	100	
02	REMOVE BOILER BILGE CASING	24	100	
03	REMOVE AIR REGISTERS	15	100	
04	INITIAL HYDROSTATIC TEST	61	100	
05	REPAIR BOILER BILGE CASING	13	100	
06	REPAIR BOILER BILGE CASING	13	100	
07	CLEAN REPAIR AIR REGISTER ASSEMBLY	0	100	
08	REMOVE REFRACTORY MATERIAL	76	100	
09	REMOVE DRUM INTERNALS	0	100	
10	REPAIR BOILER SLIDING SEAT	11	100	
11	EXPLODATORY BLOCK	40	100	
12	FINISH REPAIR BOILER BILGE CASING	24	100	
13	REPAIR INNER AIR CASING	36	100	
14	REMOVE FAB AND INSTALL GENERATING TUBES	4	100	
15	REMOVE FAB AND INSTALL ECONOMIZER TUBES	5	100	
16	REMOVE FAB AND INSTALL SUPERHEAT TUBES	8	100	
17	REMOVE FAB AND INSTALL SUPPORT TUBES	13	100	
18	RIG FOR CHEMICAL CLEANING	0	100	
19	REPAIR DRUM INTERNALS	0	100	
20	REPAIR CUTTER AIR CASING	26	100	
21	REBRICK	20	100	
22	REPAIR CLEAN TURBINE	30	100	
23	REPAIR HYDROSTATIC TEST	30	100	
24	INSTALL AIR REGISTERS	30	100	
25	INSTALL DRUM INTERNALS	30	100	
26	FINAL HYDROSTATIC TEST	30	100	
27	INSTALL PLASTIC REFRACTORY	50	100	
28		100	100	
29				
30	END			

Figure 26. Activity/Milestone Probability of Occurrence Report (Listed According to Activity/Milestone Code).

ACTIVITY/MILESTONE SCHEDULE LISTED ACCORDING TO EARLIEST START TIMES

CODE	ACTIVITY / MILESTONE DESCRIPTION	START TIMES EARLIEST (DATE)	EXPECTED DURATION (DAYS)	FINISH TIMES EARLIEST (DATE)	PER- CENT COMPLETE
PM300001	AWARD CONTRACT	10DEC76	0.0	10DEC76	0
PM300002	DISCUSS SOW CHANGE	10DEC76	77.50	10DEC76	0
PM300003	REVIEW ENGINE OPTIONS	10DEC76	301.56	10DEC76	0
PM300004	ISSUE OPERATION REQUIREMENTS	31JAN77	0.0	31JAN77	0
PM300005	PREPARE DEVELOPMENT PROPOSAL (DP)	31JAN77	191.82	31JAN77	0
PM300006	REVIEW SOW/SEAL MODEL TEST PLAN	1APR77	0.0	1APR77	0
PM300007	REVISE SOW/SEAL MODEL TEST PLAN	1APR77	10.00	1APR77	0
PM300008	REVIEW ENGINEERING PLAN	1APR77	10.00	1APR77	0
PM300009	PREPARE QUALITY PROGRAM PLAN	1APR77	26.00	1APR77	0
PM300010	PREPARE 100A MODIFICATION PLAN	1APR77	34.00	1APR77	0
PM300011	EVALUATE COMBAT SYSTEM ALTERNATIVES	1APR77	40.00	1APR77	0
PM300012	PREPARE DCAA REPORT	1APR77	45.00	1APR77	0
PM300013	PREPARE CONFIGURATION MANAGEMENT PLAN	1APR77	60.00	1APR77	0
PM300014	PREPARE SOW/SEAL ACO PLAN (CORL E001)	1APR77	103.17	1APR77	0
PM300015	CONDUCT CONTRACT DESIGN - ORIGINAL SOW	1APR77	117.53	1APR77	0
PM300016	CONDUCT ADVANCE MILITARY UTILITY ANALYSIS	1APR77	118.08	1APR77	0
PM300017	PREPARE C/S SOFTWARE MANAGEMENT PLAN	1APR77	122.50	1APR77	0
PM300018	PREPARE COMBAT SYSTEM MANAGEMENT PLAN	1APR77	133.25	1APR77	0
PM300019	PREPARE 100A SEAL VERIFICATION TEST PLAN	1APR77	133.25	1APR77	0
PM300020	REVIEW AND APPROVE 100A MODEL PLAN	1APR77	103.27	1APR77	0
PM300021	REVIEW REVISED ENGINEERING PLAN	1APR77	37.00	1APR77	0
PM300022	REVIEW CORL E012 AS NECESSARY	1APR77	10.00	1APR77	0
PM300023	PREPARE TAR	2APR77	121.07	2APR77	0
PM300024	INCORPORATE PMS COMMENTS IN ENGR PLAN	2APR77	89.00	2APR77	0
PM300025	REV AND INCORPORATE CORL E012 IN SHAP	9MAY77	29.00	9MAY77	0
PM300026	REVIEW TAR	13MAY77	5.00	13MAY77	0
PM300027	REVIEW 100A MOD. PLAN AS NECESSARY	13MAY77	8.00	13MAY77	0
PM300028	REVIEW 100A MODIFICATION PLAN	13MAY77	50.00	13MAY77	0
PM300029	CONDUCT FIRST OPB	23MAY77	1.00	23MAY77	0
PM300030	INCORPORATE PMS COMMENTS	23MAY77	10.00	23MAY77	0
PM300031	MAKE DECISION ON DSARC STATUS	23MAY77	84.28	23MAY77	0
PM300032	INCORP. C/S DECISION IN TLR, PM, SOW (U)	23MAY77	194.37	23MAY77	0
PM300033	MODIFY 100A	23MAY77	156.50	23MAY77	0
PM300034	CONDUCT 100A	23MAY77	99.92	23MAY77	0
PM300035	COMBINE DCAA REPORT WITH TAR	6JUN77	1.00	6JUN77	0

ACTIVITY STATUS : * COMPLETE * UNDERWAY

Figure 27. Activity/Milestone Schedule (Listed According to Earliest Start Times).

11. ACTIVITY SCHEDULE GRAPH.

The ACTIVITY SCHEDULE GRAPH includes all of the activities in the network (See Figure 28).

Activity Code and Percent Criticality are listed down the page. Activity Schedule Time Duration is indicated on the GRAPH by the following notation:

*** = Actual Duration of Completed Activities

XXX = Expected Activity Duration

+++ = Completed Portion of Underway Activities

--- = Range from Earliest Start to Latest Finish

C = Activity Duration Extends into Adjacent Pages

S = Scheduled Start Date

F = Scheduled Finish Date

12. ACTIVITY CODE AND DESCRIPTION FOR SCHEDULE GRAPH.

The ACTIVITY CODE AND DESCRIPTION FOR SCHEDULE GRAPH is a listing of all activities in the Schedule Graph, together with their corresponding Description and Criticality (See Figure 29). One may correlate codes between this report and the graph to identify the activity whose worktime duration is charted on the graph.

13. RESOURCE UTILIZATION HISTORY.

The RESOURCE UTILIZATION HISTORY lists all of the utilization of each specified resource. (See Figure 30).

This REPORT is broken down into four basic columns. These are: Period Ending (ending date of each time period), Resource Unit Hours Utilized by All Activities, Resource Unit Workdays Utilized by All Activities, and Daily--Resource Units. Each of the above is further subdivided into subheaded columns.

ACTIVITY CODE	ACTIVITY DESCRIPTION	CRITICALITY (PERCENT)	ACTIVITY CODE	ACTIVITY DESCRIPTION	CRITICALITY (PERCENT)
PMS00007	REVIEW ENGINE OPTIONS	0	PMS00007	REVIEW ENGINE OPTIONS	0
PMS13078	UPDATE APP	0	PMS13078	UPDATE APP	0
PMS13012	PREPARE ROUGH DRAFT JK SES SHAP	0	PMS13012	PREPARE ROUGH DRAFT JK SES SHAP	0
PMS40065	PREPARE C/S SOFTWARE MANAGEMENT PLAN	0	PMS40065	PREPARE C/S SOFTWARE MANAGEMENT PLAN	0
PMS40063	PREPARE COMBAT SYSTEM MANAGEMENT PLAN	0	PMS40063	PREPARE COMBAT SYSTEM MANAGEMENT PLAN	0
PMS40004	REVIEW AND APPROVE 100A MODEL PLAN	0	PMS40004	REVIEW AND APPROVE 100A MODEL PLAN	0
PMS00036	REVIEW SOW W/H ENGINEERING PLAN	0	PMS00036	REVIEW SOW W/H ENGINEERING PLAN	0
PMS00037	PREPARE TAG SED ENGINEERING PLAN	0	PMS00037	PREPARE TAG SED ENGINEERING PLAN	0
PMS30033	REV AND INCORPORATE CDRL E012 IN SHAP	0	PMS30033	REV AND INCORPORATE CDRL E012 IN SHAP	0
PMS30009	CONDUCT FIRST QPR	0	PMS30009	CONDUCT FIRST QPR	0
PMS40060	INCORP. C/S DECISION IN TLR, PM, SOW (U)	0	PMS40060	INCORP. C/S DECISION IN TLR, PM, SOW (U)	0
PMS13077	REV AND INCORPORATE ENGR PLAN IN SHAP	0	PMS13077	REV AND INCORPORATE ENGR PLAN IN SHAP	0
PMS00042	NEGOTIATE W/SUPSHIPS FOR ON-SITE SUPPORT	0	PMS00042	NEGOTIATE W/SUPSHIPS FOR ON-SITE SUPPORT	0
PMS00026	NEGOTIATE W/NAVSEA FOR LOGISTICS SUPPORT	0	PMS00026	NEGOTIATE W/NAVSEA FOR LOGISTICS SUPPORT	0
PMS00019	NEGOTIATE W/NAVSEA FOR COMB SYS SUPPORT	0	PMS00019	NEGOTIATE W/NAVSEA FOR COMB SYS SUPPORT	0
PMS00021	NEGOTIATE W/NAVSEA FOR ELEC SYS SUPPORT	0	PMS00021	NEGOTIATE W/NAVSEA FOR ELEC SYS SUPPORT	0
PMS00028	NEGOTIATE W/NAVSEC FOR TEST SITE DESIGN	0	PMS00028	NEGOTIATE W/NAVSEC FOR TEST SITE DESIGN	0
PMS00064	SUBMIT CSMP FOR REVIEW	0	PMS00064	SUBMIT CSMP FOR REVIEW	0
PMS00066	REVIEW DRAFT C/S MANAGEMENT PLAN	0	PMS00066	REVIEW DRAFT C/S MANAGEMENT PLAN	0
PMS13022	INCORPORATE SOW INTO SHAP	0	PMS13022	INCORPORATE SOW INTO SHAP	0
PMS00067	COORDINATE C/S MANAGEMENT PLANS W/PARMS	0	PMS00067	COORDINATE C/S MANAGEMENT PLANS W/PARMS	0
PMS40062	PREPARE COMBAT SYSTEM DES REQUIREMENTS	0	PMS40062	PREPARE COMBAT SYSTEM DES REQUIREMENTS	0

Figure 29. Activity Code and Description for Schedule Graph.

[illegible]

Figure 30. Resource Utilization History.

Period Ending (Date). Lists ending date of specified time period. Also code following indicates: "*" = Actual Utilization for the time period; "+" = Sum of actual plus remaining Projected Utilization for this time period.

Resource Unit Hours Utilized by All Activities. Lists Minimum, Expected, and Maximum Projected Utilization. Actual Utilization is listed under the Expected Column.

NOTE: The hours given are determined by multiplying Resource Unit Workdays by the number of Hours in a Working Day (see FORM C-10). Each figure (i.e. Minimum, Expected, and Maximum) is calculated in the same way.

Resource Unit Workdays Utilized by All Activities.
Actual Utilization is listed under the Expected Column.

An additional column, Cumulative (Expected), provides the user with a Summation of Expected values.

Daily--Resource Units. Resource Units Required by Activity with Highest Demand (UNITS) is shown, together with Maximum Requirements (UNITS). Also listed are the Available Resource (UNITS) and Expected Percent Utilization of Available Resources.

TOTALS (not in example figure) listed at the end of the report include: Total Expected Resource Unit Hours Utilization; Total Expected Resource Unit Workdays Utilization; Overall Resource Units Expected Utilization (based on Resources Available).

14. RESOURCE REQUIREMENTS GRAPH.

The RESOURCE REQUIREMENTS GRAPH consists of two sections.

a. Schedule Section (See Figure 31).

The first section lists Activity Code, Percent Criticality, and Average Daily Resource Units Required. It charts the following:

*** = Actual Duration of Completed Activities

XXX = Expected Activity Duration

+++ = Completed Portion of Underway Activities

--- = Range from Earliest Start to Latest Finish

C = Activity Duration Extends to Adjacent Pages

b. Summary Section (See Figure 32).

This section presents graphically the additive requirements of all of the activities listed in the foregoing section (i.e., all of the activities utilizing the particular resource, for each workday or time period).

15. ACTIVITY CODE AND DESCRIPTION FOR RESOURCE REQUIREMENTS GRAPH. This report is similar in content and format to Figure 29: Activity Code and Description for Schedule Graph. As in Figure 29, Activity Codes and Descriptions with their corresponding Criticality Percents is listed on this report.

TIME PERIOD = 1 WEEK(S)

0000 = ACTUAL DURATION OF COMPLETED ACTIVITIES
XXXX = EXPECTED ACTIVITY DURATION
C = ACTIVITY DURATION EXTENDS INTO ADJACENT PA

FROM DEC 76 THRU NOV 78

•

PERIOD ENDING :	PERCENT	AVG DAILY	RESOURCE	UNITS	ACTIVITY	CALLI-	CODE	REQUIRED
0	133	12	12	12	12	12	12	12
1	133	12	12	12	12	12	12	12
2	133	12	12	12	12	12	12	12
3	133	12	12	12	12	12	12	12
4	133	12	12	12	12	12	12	12
5	133	12	12	12	12	12	12	12
6	133	12	12	12	12	12	12	12
7	133	12	12	12	12	12	12	12
8	133	12	12	12	12	12	12	12
9	133	12	12	12	12	12	12	12
10	133	12	12	12	12	12	12	12
11	133	12	12	12	12	12	12	12
12	133	12	12	12	12	12	12	12
13	133	12	12	12	12	12	12	12
14	133	12	12	12	12	12	12	12
15	133	12	12	12	12	12	12	12
16	133	12	12	12	12	12	12	12
17	133	12	12	12	12	12	12	12
18	133	12	12	12	12	12	12	12
19	133	12	12	12	12	12	12	12
20	133	12	12	12	12	12	12	12
21	133	12	12	12	12	12	12	12
22	133	12	12	12	12	12	12	12
23	133	12	12	12	12	12	12	12
24	133	12	12	12	12	12	12	12
25	133	12	12	12	12	12	12	12
26	133	12	12	12	12	12	12	12
27	133	12	12	12	12	12	12	12
28	133	12	12	12	12	12	12	12
29	133	12	12	12	12	12	12	12
30	133	12	12	12	12	12	12	12
31	133	12	12	12	12	12	12	12
32	133	12	12	12	12	12	12	12
33	133	12	12	12	12	12	12	12
34	133	12	12	12	12	12	12	12
35	133	12	12	12	12	12	12	12
36	133	12	12	12	12	12	12	12
37	133	12	12	12	12	12	12	12
38	133	12	12	12	12	12	12	12
39	133	12	12	12	12	12	12	12
40	133	12	12	12	12	12	12	12
41	133	12	12	12	12	12	12	12
42	133	12	12	12	12	12	12	12
43	133	12	12	12	12	12	12	12
44	133	12	12	12	12	12	12	12
45	133	12	12	12	12	12	12	12
46	133	12	12	12	12	12	12	12
47	133	12	12	12	12	12	12	12
48	133	12	12	12	12	12	12	12
49	133	12	12	12	12	12	12	12
50	133	12	12	12	12	12	12	12
51	133	12	12	12	12	12	12	12
52	133	12	12	12	12	12	12	12
53	133	12	12	12	12	12	12	12
54	133	12	12	12	12	12	12	12
55	133	12	12	12	12	12	12	12
56	133	12	12	12	12	12	12	12
57	133	12	12</					

Figure 31. Resource Requirements Graph (Schedule).

MANAGEMENT LEVEL NET (NO RESOURCE CONSTRAINT) 24AUG77

(CONTINUED)

RESOURCE REQUIREMENTS GRAPH

RESOURCE CODE : MEN DESCRIPTION : PMS304 MEN
NUMBER OF RESOURCE UNITS AVAILABLE : 10000.00

I = RANGE FROM MAXIMUM TO MINIMUM REQUIREMENTS E = EXPECTED REQUIREMENTS
FROM DEC 76 THRU NOV 78

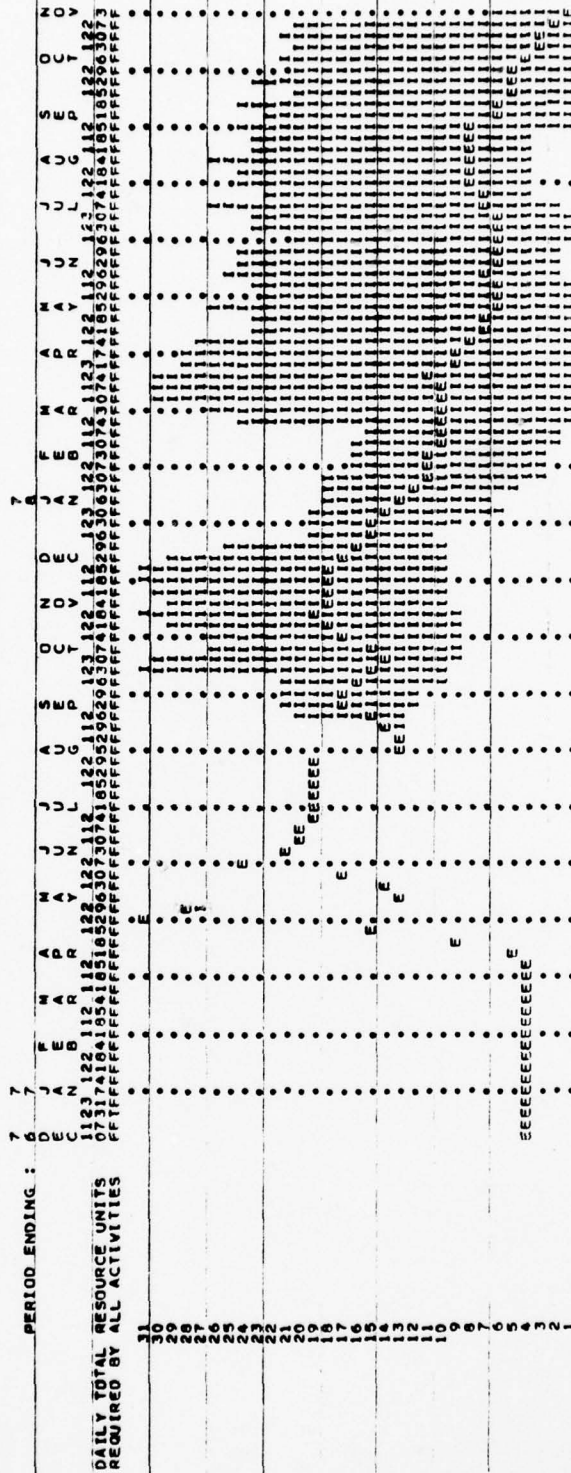


Figure 32. Resource Requirements Graph (Summary).

16. AGGREGATE RESOURCE REPORTS.

AGGREGATE RESOURCE REPORTS are similar to the previously mentioned Resource Reports except that as denoted by the word, "aggregate," these reports show results of a combination of two or more activity resources. Figures 33 is similar to the previously mentioned Resource Utilization History (See Section 13) and Figures 34 and 35 are similar to the previously mentioned Resource History Graphs (See Section 14). Note here that "history" and "requirements" are used interchangeably. Not shown, but possible to retrieve is a report on Activity Code and Description for Aggregate... which is similar to other Activity Code and Description... reports (See Section 12).

Additional reports are as follows:

a. CUMULATIVE AGGREGATE RESOURCE HISTORY GRAPH (See Figure 36).

This report presents the information in terms of cumulative requirements for the specified resource(s).

b. AGGREGATE RESOURCE SUMMARY GRAPH (See Figure 37).

This report lists the minimum, expected, and maximum requirements resource utilization of the specified resource over the entire duration of the project.

As indicated ("X" = Percent Probability (rounded); "C" = Cumulative Percent Probability), the graph charts the percent probability that the Total Resources expended would be at that specified percent probability (i.e., where the X's end; cumulative probability for total project is indicated by the C's).

AGGREGATE RESOURCE HISTORY

TOTAL COST

RESOURCE CODES :	DESCRIPTION :
GENTECH	GENERAL TECHNICIANS
GENMACH	GENERAL MACHINISTS
CHEMTECH	CHEMICAL TECHNICIANS
PIPEFTR	PIPE FITTERS
MAINTMAN	GEN. MAINT. MEN

UPDATED ON 14 FEB 77

MINIMUM VALUE :	5TH PERCENTILE
MAXIMUM VALUE :	95TH PERCENTILE

MINIMUM VALUE :	5TH PERCENTILE
MAXIMUM VALUE :	95TH PERCENTILE

NET PER WORKDAY
(DOLLARS)

DATE	(MIN)	(EXPECTED)	(MAX)	(MIN)	(EXPECTED)	(MAX)
1 FEB 77		28			28	
2 FEB 77		28			28	
3 FEB 77		28			744	
4 FEB 77		31			1055	
7 FEB 77		31			1366	
8 FEB 77		45			1801	
9 FEB 77		45			2236	
10 FEB 77		45			3601	
11 FEB 77		45			3601	
12 FEB 77	375	45	436	3541	3971	3531
15 FEB 77	415	437	437	3976	3976	3976
16 FEB 77	435	437	437	4411	4411	4411
17 FEB 77	437	437	437	4845	4845	4845
18 FEB 77	444	437	437	5285	5285	5285
22 FEB 77	444	437	437	5666	5666	5666
23 FEB 77	444	437	437	6117	6117	6117
24 FEB 77	444	437	437	6481	6481	6481
25 FEB 77	433	437	437	6861	6861	6861
26 FEB 77	439	437	437	7044	7044	7044
27 FEB 77	434	437	437	7274	7274	7274
1 MAR 77	434	437	437	7513	7513	7513
2 MAR 77	437	437	437	7612	7612	7612
3 MAR 77	437	437	437	7998	7998	7998
4 MAR 77	437	437	437	8378	8378	8378
5 MAR 77	437	437	437	8760	8760	8760
6 MAR 77	437	437	437	9141	9141	9141
7 MAR 77	437	437	437	9526	9526	9526
8 MAR 77	437	437	437	9911	9911	9911
9 MAR 77	437	437	437	10291	10291	10291
				10671	10671	10671
				11056	11056	11056
				11460	11460	11460
				11806	11806	11806

Figure 33. Aggregate Resource History.

CUMULATIVE AGGREGATE RESOURCE HISTORY GRAPH

TOTAL COST

MAXIMUM COST	=	38115	(95TH PERCENTILE)
EXPECTED COST	=	33772	
MINIMUM COST	=	29371	(5TH PERCENTILE)

	I = CUMULATIVE MAXIMUM (95TH PERCENTILE)	E = CUMULATIVE EXPECTED
	= CUMULATIVE MINIMUM (5TH PERCENTILE)	* = CUMULATIVE ACTUAL

UPDATED ON 14 FEB 77

DATES : 1 FEB 77 THRU 22 JUN 77

MAR 77

APR 77

MAY 77

JUN 77

[illegible]

Figure 36. Cumulative Aggregate Resource History Graph.

GATE RESOURCE SUMMARY GRAPH

TOTAL COST

RESOURCE CODE'S :	DESCRIPTION :
GENTECH	GENERAL TECHNICIANS
GINMACH	GENERAL MACHINISTS
CH-EMTECH	CHEMICAL TECHNICIANS
PIPEFILTR	PIPE FILTERS
MAINMAN	GEN. MAINT. MEN

MAXIMUM COST :	40387
EXPECTED COST :	23772
MINIMUM COST :	28442

X = PERCENT PROBABILITY (ROUNDED)	C = CUMULATIVE PERCENT PROBABILITY
10	10
20	20
30	30
40	40
50	50
60	60
70	70
80	80
90	90
100	100

[illegible]

Figure 37. Aggregate Resource Summary Graph.

17. ACTIVITY STATUS REPORTS.

The ACTIVITY STATUS REPORT is generated for a specific Time Period and Responsibility Code. All activities having a particular Responsibility Code are listed by their Activity Code and Description in chronological order. All reports list Network Code (if given), Activity Code and Description, and Percent Criticality.

There are three basic kinds of Activity Status Reports. These are:

- a. ACTIVITY STATUS REPORT (For Activities Underway for Responsibility). This section lists those activities actually underway at the beginning of the specified time period interval, together with Actual Start Dates, plus the four possible Finish Dates (Schedule, Earliest, Expected, and Latest). Scheduled Dates are listed when supplied on FORM C-1A. If an activity has been completed, the Actual Finish Date is listed under the Expected Finish Date column.
- b. ACTIVITY STATUS REPORT (For Activities Due to Start).
In this section, all activities for the given responsibility which have started or have some possibility of starting within the specified report time period, are listed.
- c. ACTIVITY STATUS REPORT (For Activities Due to Complete).
In this section, all activities for the specified responsibility which have actually been completed or have any possibility of being completed within the report time period, are listed.

BOILER REPAIR MODEL ----- 29SEP77

ACTIVITY STATUS REPORT

PERIOD = 7FEB77 THROUGH 29FEB77

ACTIVITIES UNDERWAY (UNDERWAY AS OF BEGINNING OF 7FEB77)

YARD

NETWORK	ACTIVITY CODE	ACTIVITY DESCRIPTION	PERCENT CRITIC-ALITY	ACTUAL START DATE	SCHEDULED START DATE	FINISH TIMES	REMARKS
1	04	INITIAL HYDROSTATIC TEST	0	1FEB77	04MAY77	0FEB77	
1	05	REMOVE BOILER BILGE CASING	47	1FEB77	20APR77	20APR77	7JUL77
1	06	CLEAN REPAIR AIR REGISTER ASSEMBLY	0	1FEB77	20APR77	13SEP77	3FEB78

Figure 38. Activity Status Report (Activities Underway).

ROILER REPAIR MODEL ----- 29SEP77

ACTIVITY STATUS REPORT									
PERIOD =		7FEB77		THROUGH		29FEB77			
ACTIVITIES DUE TO START									
YARD									

ACTIVITIES DUE TO START		YARD		-----		-----			

NETWORK	ACTIVITY CODE	ACTIVITY DESCRIPTION		PERCENT CRITIC-ALITY	SCHEDULE	EARLIEST	EXPECTED	LATEST	EXPECTED DURATION (WORKDAYS)

1	09	REMOVE DRUM INTERNALS		0	09FEB77	09FEB77	09FEB77		12
1	08	REMOVE REFRACTORY MATERIAL		53	09FEB77	09FEB77	09FEB77		35
1	19	RIG FOR CHEMICAL CLEANING		0	09FEB77	09FEB77	09FEB77		49
1	20	REPAIR DRUM INTERNALS		0	14FEB77	16FEB77	25FEB77	08MAR77	58

Figure 39. Activity Status Report (Activities Due to Start).

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BOILER REPAIR MODEL ----- 29SEP77

ACTIVITY STATUS REPORT									
PERIOD =		7FER77	THROUGH	25FER77					
ACTIVITIES DUE TO COMPLETE									
YARD									
NETWORK		ACTIVITY CODE	ACTIVITY DESCRIPTION		PERCENT CRITIC-ALITY	SCHEDULE	EARLIEST	EXPECTED	LATEST
							FINISH TIMES		
							(DATE)		
1	04 C9	INITIAL HYDROSTATIC TEST REMOVE DRUM INTERNALS			0	16FER77	23FER77	31FER77	08MAR77

Figure 40. Activity Status Report (Activities Due to Complete).